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Article title: Responding to the environmental crisis through education: the imperative for teacher support across all disciplines
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Abstract

The most recent Intergovernmental Panel on Climate Change report (IPCC, 2023) sets out sobering scenarios about the future for our young people and appeals for "deep, rapid, and sustained reductions in greenhouse gas emissions" (ibid, p. 12). Although technological responses are essential to achieve these reductions, technocratic solutions will not solve the environmental crisis; instead, a widespread societal transformation is needed. Education can play a profound role in this transformation as it is fundamental to building a society with knowledge, skills and wherewithal to boldly tackle climate change as well as the broader environmental crisis. This commentary reflects on multiple dimensions of this role and focuses particularly on schools and the important contribution that all subjects can make towards developing interdisciplinary, complex understandings of the environmental crisis and how we can live more sustainably. Drawing from a recent nation-wide survey of teachers in England carried out by UCLs Centre for Climate Change and Sustainability Education (Greer, Sheldrake, et al., 2023), we highlight a troubling lack of engagement in formal professional development related to climate change and sustainability, even amongst a 'climate change engaged' cohort of teachers, and the imperative for comprehensive professional development for teachers from across all disciplines, as part of the response to the environmental crisis.

Responding to the environmental crisis through education: the imperative for teacher support across all disciplines

The most recent Intergovernmental Panel on Climate Change report (IPCC, 2023) set out sobering scenarios about the future for our young people predicting that "adverse impacts from human-caused climate change will continue to intensify" (IPCC, 2023, p. 6). The UN Secretary General, Antonio Guterres, recently stated that "climate change is out of control" and that "if we persist in delaying the key measures that are needed, I think we are entering a catastrophic situation" (Guardian staff and agencies, 2023). Yet, recent assessments of the UK Government's climate change response are gloomy. The independent Climate Change Committee has highlighted a "lack of urgency" (2023, p. 14) in the current UK Government response and an "overly narrow approach to solutions which, crucially, does not embrace the need to reduce demand for high-carbon activities" (2023, p. 13). The mandate for "deep, rapid, and sustained reductions in greenhouse gas emissions" (IPCC, 2023, p. 12) is unequivocal, and technological responses are essential. However, a narrow view that focuses on technocratic solutions will not solve the environmental crisis; instead, a widespread societal transformation that recognises the "interdependence of climate, ecosystems and biodiversity, and human societies" (IPCC, 2023, p. 3) is needed. Education has a vital role to play in this transformation because humans need to a) learn to avoid reproducing the damaging social structures and attitudes that have led us into the crisis, b) develop the capabilities to repair the environmental damage caused, and c) understand how to forge sustainable ways of living.

Education that responds to the environmental crisis can be understood broadly and enacted in formal and informal settings. Education institutions, including schools, can play a part in greenhouse gas emission reductions that are so urgently needed through energy, transport, procurement and food policies and actions; indeed, according to the DfE, "schools and universities represent 36% of total UK public sector building emissions" (DfE, 2022). They can promote more sustainable lifestyles by reducing resource use, reusing and recycling, growing food and encouraging plant-based diets. Institutions can contribute to restoring and enhancing biodiversity, by conserving and regenerating pockets of estate grounds or local landscapes. Such actions, which take leadership, commitment, and investment, can position education institutions as demonstration and learning hubs for students and staff, parents and school communities.

Alongside such practical actions, education can play a much more profound role in societal transformation as it is fundamental to building a society with knowledge, skills and wherewithal to boldly tackle the environmental and *un*-sustainability crisis. This first requires recognition of the crisis, followed by both subtle and substantial reorientations across the education system, towards ecologically- (rather than economically-) centred policies and the promotion of multi-species justice. It requires a shift away from producing and reproducing forms of knowledge and culture that have led to the crisis and are in service of economies that are built on extractive processes, towards knowledge and culture that is in service of all species on Earth (Wals & Mathie, 2022). Homing in on knowledge - one important dimension of this shift - the world's scientific community (IPCC, 2023) has recently re-emphasised the need for diverse knowledge in response to climate change, an argument familiar to

environmental education scholars. This must include socio-emotional and indigenous knowledge, as well as the sorts of disciplinary knowledge and skills that tend to be taught in schools. Every subject can contribute towards developing the interdisciplinary, complex understandings of the environmental crisis and how we can live more sustainably.

Researchers have identified the ongoing prevalence of subject-specific knowledge-led approaches to climate change education, especially science (Monroe et al., 2019; Rousell & Cutter-Mackenzie-Knowles, 2020). In England, where schools are dominated by curriculum, exams and inspection (Gewirtz et al., 2019), the few direct mentions of climate change in the National Curriculum are concentrated within geography and science (Greer, King, et al., 2023). Whilst advocating for broad, expansive educational approaches to the environmental crisis and transformation across the education system, UCLs Centre for Climate Change and Sustainability Education (CCCSE) recognises the current context in which schools operate. Therefore, given that immediate responses to the crisis are needed, teachers need support to incorporate climate change and sustainability into their subject-based teaching practices.

The work of CCCSE, which was established in 2022, has been informed by an initial study (Gillow et al., 2022) which identified inconsistencies in the quality and availability of climate change and sustainability education in England, and noted that teachers sought more "time, confidence and resources" (2022, p. 17) to incorporate climate change into their teaching, a finding that is supported elsewhere (Howard-Jones et al., 2021; SOS-UK, 2021). However, little is known about the types of support teachers already have access to, the types they seek, and for whom this support would be most helpful. That is why CCCSE set out to investigate teachers' perspectives of climate change and sustainability education, with a particular focus on their teaching practice and professional development, through a nationwide survey (supported by the UCL IOE Strategic Investment Fund).

The results from our initial analysis (Greer, Sheldrake, et al., 2023) can be viewed as representing a 'climate change engaged' cohort of teachers: of 870 respondents, 81% reported that they 'sometimes', 'often' or 'very often' incorporate climate change and sustainability in their teaching. Amongst this cohort, climate change and sustainability were most commonly incorporated into geography and science in secondary settings. Whilst this finding is unsurprising, it is concerning. Climate change, and the broader environmental crisis of which it is a part, is too complex to narrow down to a list of topics to learn in science and geography (Hulme, 2021). Any constructive response will require creativity, criticality, empathy, and 'knowledge' from across disciplines and epistemologies. While the knowledge and skills contained within the disciplines of geography and science are important, teaching scientific facts alone can exacerbate eco-anxiety (Ojala, 2016; Rousell & Cutter-Mackenzie-Knowles, 2020) which is why teaching across the curriculum is needed.

Our survey findings are most telling when it comes to professional development (PD). We found that less than half of the teachers involved in the survey considered that they had participated in PD related to climate change and sustainability. Of those who had, less than 13% considered that there had been a focus on climate change and sustainability in their Initial Teacher Education, whilst the most commonly reported type of PD was 'self-taught'. This distinct lack of engagement in formal PD, even amongst our 'climate change engaged' cohort of teachers who are mostly teachers of geography and science, is troubling.

The most effective way to reach young people, and to help them develop capabilities to respond to the climate crisis, is through confident and capable teachers. That is why, in response to the survey findings, the CCCSE is developing climate change and sustainability PD for teachers, including and beyond geography and science, and across age phases. The programme - *Teaching for Sustainable Futures* – will support teachers from *all* disciplinary backgrounds to critically incorporate climate change and sustainability into their teaching practice, thereby enabling young people to understand Earth as an interconnected system of which they are a part, while developing the agency and capabilities to act for the environment and for a socially just, equitable and compassionate society. *Teaching for Sustainable Futures* will be available online at no cost to teachers of primary and secondary stages, starting with geography and history in 2023, and expanding to English and mathematics in 2024.

Alongside *Teaching for Sustainable Futures* the CCCSEs work programme extends to research into climate change and sustainability policy and practice, alongside national and international knowledge exchange and policy dialogue, with the aim of contributing to advancing effective climate change and sustainability education in England, and further afield.

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