

‘Let's talk about the weather’: The activist curriculum and global climate change education

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'Let's talk about the weather': The activist curriculum and global climate change education

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Abstract

Activist movements have garnered significant global attention on a range of sustainability issues, often involving collectives of citizens coming together. Invoked is the idea of citizens informed to act, emerging not from a common-sense understanding of everyday life, but rather from a deep political understanding of the world—one that is underpinned by a level of civics knowledge that provides the intellectual basis for engaging in public discussions and planning citizen action. Here, the possibility of transformative activist curricular movements for climate education arises and whether to change the curriculum, or to see curriculum as change in itself. This paper examines what schools and teachers can do to develop children's understanding of and engagement with the issues, and to address their concerns, informed by John Dewey's notion of social action and his ideas on democracy and thinking. The discussion draws on a global movement in climate education, and the case of a group of schools in England. The two cases, chosen as illustrative, are theorised by means of Maton's semantic variation theory to identify how the systems of meaning in these, and similar, contexts can be made accessible. How the sustainable development goals (SDGs) of quality education (SDG4) and climate action (SDG13) can be achieved, including the design of the curriculum by teachers, is examined. The need for an activist curriculum is discussed, one that is integrated and embedded rather than inserted, in

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which young people can engage with and respond to the issues that they face. Such a curriculum posits the school as both democratic and open, in the sense of having boundaries that are fluid and permeable to the concerns of society, while also giving access to disciplinary knowledge that is the basis of conceptual understanding of the problems of, as well as the solutions to, climate change.

KEYWORDS

activism, climate, curriculum, sustainability

Key insights**What is the main issue that the paper addresses?**

Raising important questions about climate and the effects of global warming with young people is difficult and problematic. What schools and teachers can do to address this is unclear. What children need to know and understand, and why, needs to be clarified in order that they can be active citizens.

What are the main insights that the paper provides?

Dewey's ideas on social action and democracy provide the basis for a curriculum for climate change education. Two cases are described that illustrate the responses that schools can make. The analysis points to curriculum as a system of meaning for children that enables them to make sense and be active.

INTRODUCTION

This paper addresses climate change education in a moment of extreme concern, as representative of change that is impacting on lives and the world, and the responses that people can make individually and collectively, in a way that makes a difference. The main theme is how children think and feel about this, against a backdrop of debate between climate advocates and deniers, and the notion of children as activists, as distinct from the notion of children as protesters (Huntley, 2020). Representative of the latter is the School Strike for Climate, known also as Fridays for Future, and Youth for Climate, an international movement of school students demonstrating to demand action from political leaders. Led by Greta Thunberg's staging of a protest in 2018 outside the Swedish parliament, the strikes inspired reactions from hundreds of thousands of children, posing a 'reckoning for education' (Verlie & Flynn, 2022). Thunberg, in her TED talk 'The disarming case to act right now on climate change' (Thunberg, 2018), opined: 'Once we act, hope is everywhere' (n.p.). However, while protest is reactive, often expressed as dissent or objection to forms of authority, many forms of activism take the form of proactive advocacy in trying to bring about change. As a starting point, this paper asks to what extent the right to protest stands as proxy for the right to be active, and how education, and the curriculum, can enable the latter.

The notion of action, and the meaningful words that provoke it, raises questions about the manipulation of young people's thoughts and emotions. The first section of this paper discusses what constitutes activism in education, and how children are implicated and make sense of it. However, economic, scientific, technological and political change is so rapid that it is hard for individuals to meaningfully assimilate them. Throughout, the paper draws on the ideas of John Dewey (1900, 1916, 1933, 2008), and his work on thinking and the formation of concepts, in which he argued that new experiences are mediated by meanings gathered from past experiences, and that we need time for the slow accretion of meanings, and to test new ideas. This notion of meaning-making over time is challenged by the rapid effects of globalisation and climate change, and the emergence of 'technicist concern' and 'technicist thinking' (Laverty, 2016) that is dominated by the desire to be delivered from problematic situations, and less so by the need for critical reflection, enlightenment and conceptual understanding.

In the second section, the efficacy of the curriculum is examined as a means by which children can encounter the issues that face society, in order to develop conceptual understanding. While Dewey's (1916) ideas on democracy and education were shared over a century ago, his work has still much to offer given that the task of democracy—the 'creation of a freer and more humane experience in which all share and to which all contribute'—continues to confront us (Dewey, 2008, p. 230). In 1933, Dewey refreshed the case made in earlier work for conceptual understanding of the world and its issues, and more recently Rata (2021) has developed the notion of conceptual coherence and its importance in curriculum design. These ideas circulate in a debate about the purpose of the curriculum and the reductive binary of traditional versus progressive views on knowledge (Pountney & McPhail, 2019). The next section, on climate education itself, explores the possible approaches that can be taken and how curricular interventions provoked by climate change vary as to the degree of integration of curriculum knowledge. Two illustrative cases are examined: one instance of a global approach that, while teacher-led, encourages children to create their own solutions to climate change; and the second an example of local school/community involvement in which young people make a personal response to understanding and engaging with the issues.

The final section of the paper builds on an analysis of the cases to theorise the systems of meaning that emerge by means of semantic variation (Maton, 2013). A case is made for an activist curriculum that can promote the sustainable development goals (SDGs) of quality education (SDG4) and climate action (SDG13) (Pountney, 2021). What schools and teachers can do to develop children's understanding of and engagement with the issues, and to address their concerns, is discussed.

ACTIVISM AND EDUCATION

Taking activism to mean the efforts and actions taken to address social, political, economic, environmental and cultural issues, it takes many forms including marches, writing, community organising, protest art, fundraising, strikes and digital activism (Martin et al., 2007). It also includes 'quiet activism' (Pottinger, 2017) as 'small, everyday, embodied acts, often of making and creating, that can be either implicitly or explicitly political in nature' (p. 215). Activist movements have garnered significant global attention on a range of sustainability issues, involving collectives of citizens coming together (Niblett, 2017). However, the idea of climate emergency as a communal concern is mediated by a view of environmental and climate change as a distant or future problem, rather than an immediate and local one, and as a 'socioscientific issue', requiring specialised scientific knowledge and a critical interpretation of the issues (Hodson, 2020). Alongside this is the notion of climate anxiety, and the concern that these problems are beyond the influence of ordinary people as a taboo subject in

schools. Others argue that talking about climate to everyone is essential (Maslin, 2021), in order to proactively change the world through learning (Fullan et al., 2017). Here, the question arises of whether to change the curriculum, or to see curriculum as change itself, through transformative activist curricular movements (Gorlewski & Nuñez, 2020). Invoked here is the idea of citizens informed to take action that emerges, not from a common-sense understanding of everyday life, but rather from a deep political understanding of the world—one that is underpinned by a level of civics knowledge that provides the intellectual basis for engaging in public discussions and planning citizen action (Jerome, 2018).

There is a growing consensus of the need to equip children with the scientific skills and knowledge to respond to the problems facing the world in the twenty-first century (Herranen et al., 2021). Such approaches include how to promote talk about sustainability and climate in high-quality learning experiences for children, in both formal settings such as school environments and less formal settings such as home environments (Li et al., 2021). Indeed, the sense that it is a 'taboo subject' has been overtaken by events that are directly affecting the daily lives of people, and it is suggested that the first and most important thing that people can do is talk about climate to everyone (Maslin, 2021). Furthermore, as Michael Fullan reminds us, the circumstances that we are faced with make it essential that we proactively change the world through learning (Fullan et al., 2017), including the ways in which we can actively promote science knowledge in inquiry-based approaches (Lin et al., 2021). Alongside the importance of introducing children to caring for the planet and building skills to explore sustainability is the notion of climate anxiety, and the concern that these problems are beyond the influence of ordinary people.

The debate around climate can be seen to divide opinion, and can be the subject of intense public argument, disagreement or disapproval. Such debate includes the question of whether schools should involve children in issues that are political. One viewpoint suggests that controversy is a core part of the learning enterprise, especially in science, and that schools should prepare citizens who can navigate different perspectives and make sense of conflicting arguments on scientific issues that impact their everyday lives (Lin et al., 2021). However, while being able to reason about and act on controversial topics is fundamental to being democratically literate, we have often been reluctant in our schools to engage students in the examination of controversial topics. The case for politically impartial teachers tends to dominate, and teachers need guidance on how to teach climate change in a way that is politically impartial whilst remaining accurate about the scientific concepts which underpin climate change and sustainability (Hoath & Dave, 2022). Notable here is that in England, the Department for Education's guidance on political impartiality in schools (DfE, 2022a) states that teaching about climate change, and the scientific facts and evidence behind it, would not be considered to be teaching about a political issue. It should also be noted that taking action by children includes the benevolent outcomes that arise from school-community action (e.g., the protection of local woodland and wildlife resulting from curriculum activities that focus on the local environment).

John Dewey and social action

John Dewey (1916), in *Social action*, took as central to his concerns the notion of democracy, arguing: 'Democracy must be reborn in each generation. Education is the midwife.' His view of knowledge as a 'public and common store' (Dewey, 1900) shaped his view of democracy, alongside notions of 'intelligence that is socially organised' (p. 29). The link with politics is an uneasy one, but Dewey held a view of politics as productive and generative, not simply a bitter distributive struggle over scarce resources. This view, he argued, is a form of 'social intelligence', one echoed by the ideas of Crick (1962) of politics as a 'great and civilizing

activity' (p. 1). Indeed, the reduction of the meaning of politics to conflicting viewpoints, as in party politics, on how society should be organised and managed, reduces it to a mere zero-sum game, which is increasingly protective and unilateral. Dewey insisted that the route to social action requires, and is, 'socially organised intelligence' (Dewey, 1900, p. 29)—to act in creative ways for social justice, an intelligence based on critical awareness of social problems (Dietz & Davis, 2007). The link between social action and civic engagement relates to democratising education in the sense of its reconnection to the political life of communities 'and in the sense of educational and learning activities as sites for democratizing the larger society' (Boyte, 2003, p. 11).

Dewey built on his ideas around social action and democracy to examine the conception of experience, learning-by-doing and collateral learning. Thus, for Dewey, thinking is an exercise in and 'the consummate act of human freedom' (Jackson, 2012, p. 15), in which the 'why' of thinking deeply and reflectively is as important as the 'how'. To avoid concepts being mere words (Dewey termed such concepts 'nominal'), students need to know how to use these concepts—Dewey's 'genuine concepts'. Here, children's capacity for meaning-making, as a form of philosophising, is considered an 'educational good':

It identifies, at the same time as it contributes to, the common humanity of children, acknowledging them as members of the ethical community as it invites them to be a part of it. For, to philosophize with children is to assume that the child is neither a partial, nor exceptional, human being; rather, children, like adults, are endeavoring to live better, more meaningful lives, with the potential for wisdom, and the ability to shape and educate our 'adult' understanding of how to live better.

(Laverty, 2016, p. 1042)

However, Laverty also acknowledges that children's capacity for abstract thought is derived from thinking about something, and that this starts with what the child already knows or has experienced. Dewey argues that ideas are out of our conception if we do not have the things to compare them with because they are out of our experience:

The meanings of some terms and things, however, are grasped only by first calling to mind more familiar things and then tracing out connections between them and what we do not understand. Roughly speaking, the former kind of meanings is concrete; the latter abstract.

(Dewey, 1933, p. 170)

Social action, therefore, in Dewey's terms, requires specialised knowledge and specialised understanding, as civic knowledge—knowing what to act upon and why it is important, but also how to act. Dewey distinguishes between civil disobedience—refusing to obey for moral or philosophical reasons—and civic intelligence—an 'intelligence' that is devoted to addressing public or civic issues. The term 'civic intelligence' has been applied to individuals and, more commonly, to collective bodies, like organisations, institutions or societies (Schuler, 2007). It is linked with notions of civic engagement and other concepts currently receiving attention, such as participatory democracy and collaborative problem-solving. These notions are similar to John Dewey's 'cooperative intelligence', or the 'democratic faith' that asserts that 'each individual has something to contribute, and the value of each contribution can be assessed only as it entered into the final pooled intelligence constituted by the contributions of all' (Dewey, 2008, p. 220).

Dewey argued that access to knowledge makes thought possible: 'With respect to teaching there is no more important topic than the question of the way in which genuine concepts

are formed' (Dewey, 2008, p. 240). Dewey makes the important distinction between genuine concepts, those that have association with things that are real, and nominal ones, those that exist for the learner in name or form only, as symbolic of that thing: 'Nominal concepts are remote from experience and incapable of modifying apprehension, whereas genuine concepts are the intellectual deposits of experience, and which modify apprehension, understanding, and behaviour' (Lavery, 2016, p. 1031). For example, a child might know the concept of 'safety' as the condition of being protected (nominal) but can only understand safety as the experience of being safe (genuine) as the quality of averting or not causing injury, danger or loss. The focus on conceptual understanding is often misunderstood by both traditional and progressive educators: the former develop nominal as opposed to genuine concepts, while the latter underestimate Dewey's regard for the traditional focus on conceptual understanding. The traditional theory of concepts aligns them with curriculum knowledge and knowledge structures, and a pedagogic discourse (Bernstein, 1990) that shapes how the curriculum is formed. The choices that teachers make, therefore, are not reduced to a binary choice between a teacher-led and a student-engaged curriculum, but rather how the combination of these gives access to systems of meaning (Pountney & McPhail, 2019).

THE ACTIVIST CURRICULUM AND PEDAGOGY

Approaches to the curriculum that take a knowledge viewpoint have an internally focused, discipline-based approach as the starting point for analysing global issues, theories and debates from a wide range of fields. Drawing on theories of cultural reproduction, such approaches offer the means of critically examining how the curriculum is reproduced and recontextualised (Bernstein, 2000). Designing the curriculum with this in mind recognises the role of the discipline as the site of the production of knowledge, and to provide a methodology for examining the issues of globalisation to improve the curriculum and, ultimately, learning. However, the role schools should take on climate education, for example, is often contested by curriculum stakeholders, who tend to disagree not just on learning about the climate, but also about the individual and collective response that might be possible. Here, the curriculum delivered in schools serves to either maintain or interrupt the status quo, and any interruption begs the question of whether to change the curriculum, or to see curriculum as change itself. The latter position argues for a curriculum that is the source of, and vehicle for, change through transformative activist curricular movements (Gorlewski & Nuñez, 2020). However, in an era where governments prescribe national curricula, the question arises as to the agency of teachers to modify curriculum content to cover global issues such as sustainability and climate education, and whether this is possible as an interruption to the curriculum or an intervention, with the possibility of it being integrated into the curriculum as a subject in its own right (Pountney, 2021).

While the case remains to be made for schools being responsible for developing the knowledge, skills and dispositions for active citizenship, it is clear that teachers who are active in curriculum and policy creation are empowered both as teachers and activists. While this will vary across countries, it is the case even in contexts where curricula are prescribed for teachers (e.g., the National Curriculum in England), as in the case of the non-standard form of the curriculum at XP Trust as outlined below. This empowerment posits the school as both democratic and open, with boundaries that are fluid and permeable to the concerns of society (Pountney & McPhail, 2019). The open flow of ideas is important in order that people can be as informed as possible, have faith in their individual and collective capacity to solve problems and, ultimately, have concern for the welfare of others and the common good. This concern rests on the principle that democracy is not so much an 'ideal' to be pursued, as an 'idealised' set of values that we must live and be guided by. Moreover, to

achieve this, teachers need to nurture democratic and caring classroom communities, because 'to be a teacher is to be actively engaged in a social movement that is shaping the future of our society and our world' (Gorlewski & Nuñez, 2020, p. 14). Democratic education, therefore, is preparation for action, drawing from a deep political understanding of the world, underpinned by civic knowledge that provides the intellectual basis for engaging in public discussion and planning for citizen action (Jerome, 2018). Importantly, it does not preclude taking action.

However, problematic in the notion of education as preparation for action is the role of schools to prepare students for the real world. This role is contested by those who make the case for a liberal education that is associated with the acquisition of knowledge, which is theoretical rather than practical, reflective rather than instrumental and valued for its own sake rather than acquired for some use. The question then becomes whose action and for what purpose. While few would challenge the role of schools to prepare children for society by improving literacy, for example, there are concerns where this involves participative democracy (May, 2005). Here, the notion of advocacy needs to be distinguished between self-advocacy, individual advocacy and systems advocacy (Scott et al., 2009). Whereas in self-advocacy a person advocates for their own interests, individual advocacy is exercised through institutions such as the state. Systems advocacy seeks to change systems for the long term and can involve multiple organisations working together. Here, the potential for sociopolitical movements arises that stand outside formal government institutions and are formed around single issues such as poverty. These movements can be influential in shaping educational policy both positively and negatively, as in those who advocate for creationism, for example. Caution is needed therefore in making the case for an activist curriculum, especially when the issues are technical and complex.

While children should be treated as capable and confident in understanding complex and abstract issues, as long as they are made accessible and age-appropriate (Lin et al., 2021), the belief pervades that young children especially are unable to reason the controversy or to be involved in a debate around saving the planet. Importantly, all children may be alarmed and distressed by what they see on the news, or indeed have experienced themselves as a result of climate change, including floods, poor air quality and extreme heat, which each constitute adverse childhood experiences that affect learning (Siegener & Stapert, 2020; Sjöblom et al., 2022). However, one of the most important things a child learns in this early stage of development is about themselves in which an important part is a picture of themselves as learners and how they figure out whether it is okay to be curious, to explore, to ask questions and to experiment (Li et al., 2021). Some important areas of learning in the early years include communication and problem-solving skills, and a sense of belonging to family, community and culture, as well as behaving in acceptable ways and controlling your own behaviour, as socialisation. In this way, self-advocacy can progress to individual advocacy in later schooling (see above).

Returning to the ideas of Dewey on the importance of concepts, the link can be made between critical thinking about climate and the conceptual coherence of the curriculum. A lack of coherence in curriculum design—in, for example, how the selection of curriculum content is arbitrary and without purpose—weakens the durability of knowledge in a child's learning because it is less likely to develop the schema for this to endure (Pountney et al., 2025). Furthermore, critical thinking requires coherence, because in curricula with weaker coherence the focus of the learning is led and predominantly shaped by external drivers such as motivation, or opportunistic decisions about content and learning activities. The structure of this type of curriculum is around topics that appear arbitrary and unconnected to each other. Knowledge and skills are viewed as separate and discrete, and the latter is prized over the former; little attention is paid to progression or knowledge building. It is the relationship between concepts and learning content that marks a coherent curriculum from an incoherent

one, where a lack of logical sequencing disrupts 'the hierarchical flow of learning and slowed it down or impeded it' (Muller, 2022, p. 2). So, what are the concepts associated with climate education and how are they formulated into the curriculum?

CLIMATE EDUCATION AND THE CURRICULUM

The United Nations Action for Climate Empowerment (ACE) has been adopted by the United Nations Framework Convention on Climate Change (UNFCCC) to denote work under Article 6 of the Convention (1992) and Article 12 of the Paris Agreement (2015). The overarching goal of ACE is to empower all members of society to engage in climate action, through education, training, public awareness, public participation, public access to information and international cooperation on these issues. The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At its heart are the 17 SDGs, which recognise that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality and spur economic growth—all while tackling climate change and working to preserve our oceans and forests. SDG13, Climate Action, is a call to take urgent action to combat climate change and its impacts and has five targets. Of its targets, 13.3: Education on Climate Change aims to improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.

SDG13 naturally complements SDG4, Quality Education, which aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. More than any other target, 4.7 touches on the social, humanistic and moral purposes of education. It explicitly links education to other SDGs and captures the transformative aspirations of the new global development agenda. The target is, by 2030, to ensure that all learners acquire the knowledge and skills needed to promote sustainable development—including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development.

UNESCO's (2016) Global Education Monitoring (GEM) Report on its programme of 'orienting educating towards sustainability' stated that curricula are the main way that the knowledge and skills to promote sustainable development and global citizenship are typically conveyed. In terms of sustainable development and global citizenship, the report highlighted the need for relevant content, with a focus on both cognitive and non-cognitive aspects of learning, including peace and human rights education, as well as intercultural education and education for international understanding. The GEM analysis of over 110 national curriculum framework documents for primary and secondary education in 78 countries showed that over three-quarters of countries had some emphasis on sustainable development issues, but far fewer referred to terms related to global citizenship (Akar, 2016).

In terms of developing the curriculum itself, climate education is a recent addition and has mostly been covered, to date, in science and geography lessons, and in school assemblies, and rarely discussed elsewhere in the curriculum. Climate education, as a discipline, is scarcely addressed in school curricula (Eilam, 2022). The challenge is to develop climate education within school curricula as a disciplinary subject, derived from its own disciplinary knowledge and field. The term 'climate change' is one of 15 terms that Eilam finds mainly undefined, limiting the credibility of climate education as a reliable and authoritative body of knowledge.

In February 2021, over 7500 teachers across England were asked whether they had received adequate training as a teacher, during qualification or since, to educate students on climate change, its implications for the environment and societies around the world, and how these implications can be addressed (Teach the Future, 2021). 70% had received no training on any aspects. In a further survey¹ of 503 teachers on climate change and education, 92% were concerned about climate change and how they could frame climate change in teaching children. The teachers felt that they could frame it in terms of animals, nature and wildlife (64%) and in relation to health, food and wellbeing (55%); in relation to the local community (48%) and to science, innovation and technology (39%). Only 28% felt they could frame their teaching about climate in relation to citizenship and activism, and 11% in relation to politics, economics and foreign policy, echoing international studies of teachers' knowledge, belief and attitudes about climate change (Seroussi et al., 2019).

These figures stand in stark contrast to the aims of the English Department for Education Policy Paper on Climate Education (DfE, 2022b) to address the worries that children have about climate change and to inform them of the impact it is having now, and in their future lives. The obvious shortfall, therefore, in meeting the target of providing learning about the natural environment and the causes and impact of climate change and the importance of sustainability, is apparent. Teachers may argue that they are ill-prepared for particular topics, especially those not covered in their initial teacher education courses, and climate education is a notable example. However, the case for continuing professional development to address this can be made.

The curriculum as a system of meaning

The ideas and understandings associated with climate change and sustainability can be seen to form a web of interrelated concepts, bringing together natural and social sciences. They also provide for opportunities for philosophical conversation in which each child is challenged to take responsibility for what he or she means by taking care of the earth. 'These discussions provide opportunities for children to exercise their intellectual autonomy in concert with others; their thinking is informed by reflection on experience and discussion with peers' (Lavery, 2016, p. 1042) in which this shared philosophising is collective meaning-making. The focus on children's meaning-making echoes Dewey's notions that children are language users and so are recipients and producers of meaning. Through encounters with the cultural and linguistic practices of the community, a child develops conceptual understanding, thereby engaging with this inheritance to determine the true meanings of concepts (see examples below). It also manages misconceptions, and the child's critical ability to recognise fact and the notion of truth (e.g., the misunderstanding that things getting warmer is good because there will be more sunshine). Thus, the scientific nature of climate change concepts needs as much attention as the social effects of climate change itself. Here, the way of thinking about things is distinguished not just as an act of consciousness, but necessary for the progress of the human race, if not for its survival (Jackson, 2012).

The definition of the curriculum as a system of meanings is consonant with the notion of curriculum of and for knowledge, and of disciplinary knowledge as a specialised language (Bernstein, 2000). While sustainability and climate educational knowledge remains ill-defined (Eilam, 2022), and its knowledge structure horizontal and segmented (Bernstein, 1990), its capacity to develop as a bona fide educational field remains limited. This is not to say that the scientific knowledge we have of climate change is limited—quite the contrary, it is a hierarchical and specialised knowledge structure. Rather, when climate education knowledge is recontextualised in school settings it becomes descriptive and everyday, with a weakened power to explain. The focus on activism, community and equity in the cases outlined below

translates this knowledge into a powerful form that is a focus on community (Pountney & McPhail, 2019). Considering sustainability and climate education as a discourse, one can examine the language and children's access to and use of this language as a literacy. Climate literacy, therefore, mediates young children's capacity to engage with understanding the causes and effects of climate change (Pountney & Timmers, 2023), and how they encounter the world and develop a sense of their place within it, for example.

DEVELOPING ACTIVIST CLIMATE EDUCATION

Approaches to designing the curriculum for climate education are now examined by means of two cases—one a global movement in climate change education and the other the curriculum of a group of schools in England. The first case, the Climate Action Project (CAP), exemplifies a curriculum approach to teaching climate change in schools that is taken by organisations such as Take Action Global (<https://www.takeactionglobal.org/>). The project aims to address how to teach environmental awareness and provide resources and initiatives for schools to get involved. A 6-week event in October 2020–2023 focused on climate change, involving each year 2.6 million young people across 140 countries. Children worked collaboratively on solutions and meaningful action, to stimulate positive thinking about change. Working with ministries of education in 15 countries, the project created a curriculum for climate change, co-authored with the World Wildlife Fund International. Teachers became part of a networked community of practice and were guided by facilitators, and the project made an impact in many countries, culminating in a 2020 webinar 'Climate Action Day' hosted by Sir David Attenborough and involving scientists from across the world. While this approach might be characterised as an intervention, in that the effect on the curriculum may not be permanent, it raised awareness of the need for curriculum action. Typical of the school projects was the work done by school children in Portugal to produce solar lamps for children in slums in Nigeria so that they could study at night.

A white paper published by Take Action Global (Kedros & Taylor, 2023) offers a global picture of challenges and best practice in climate education, involving in-depth interviews with 14 climate change educators and experts from 10 countries to inform the design of a global survey conducted in October 2022, which returned over 1000 responses from 38 countries. Survey respondents included classroom teachers, department heads, principals and librarians, as well as those working in educator roles in wider organisations, including nature centres and government departments around the world. It led to a Climate Literacy Statement demanding worldwide access to climate literacy and education programmes to ensure holistic understanding of the ongoing climate and biodiversity crisis and its underlying causes and consequences.

The second case is one of curriculum integration, in which schools can make longer-lasting and more far-reaching changes to what is taught and learnt. XP Trust in Doncaster, England, is a small multi-academy trust of eight schools that follows the English National Curriculum but has a curriculum design based on cross-curricular, project-based learning, where the curriculum is taught via 'expeditions' that last 6–12 weeks (Pountney & McPhail, 2019). In recent curriculum planning, the schools have decided that climate change is an existential threat and an imperative part of the curriculum. Founded on Kurt Hahn's philosophy of outdoor education and experiential learning (Veevers & Allison, 2011), XP has identified 'Climate Emergency' as one of three key 'strands' in their curriculum and teachers have designed expeditions in all years of the secondary and primary schools that address this theme.

The eight schools in the trust (three secondary and five primary) each took part in Better World Day, an event aimed at raising awareness about ways to make the world a better place

in which to live. A secondary expedition, *Power to the People* (<https://xptrust.org/power-to-the-people/>) for year 10 pupils (ages 14–15) centred on the guiding question ‘Why do we need to develop a sustainable energy plan for the planet?’. It asked fundamental questions about the importance of energy in our daily lives, where we get it from, how we produce and distribute it, the impact on the planet and the use of Earth’s resources and how we can begin to build a secure and sustainable energy future for us all. Divided into three case studies, the first started with ‘What is energy?’—how we extract and use fossil fuels to generate energy to supply the nation grid and the chemical nature of fossil fuels, and how their combustion leads to an increase in CO₂ emissions. The expedition involved the chemistry of organic compounds and the processes that are used to extract them from crude oil. A second case study, ‘How do we get power to the people?’, then explored the concept of energy itself and the different forms it takes—from the chemical energy we find in fossil fuels to the other forms of energy stores and transfers which may be more useful in sustainable energy and the fight against climate change.

An essential component of expeditions is an immersion, a visceral experience that provides children with context and first-hand contact with the object of their study. In *Power to the People*, the children went on a virtual tour of a local power station, which prompted them to begin questioning their notions about the source of our energy, its myriad uses, our personal consumption of power and contemporary society’s reliance upon energy. Case study three, ‘A change in the atmosphere’, looked at the development of the Earth’s atmosphere from its early history to the present day. It sought to understand the delicate balance between the removal and release of carbon dioxide and how proportionally, very small increases in carbon dioxide, methane and other greenhouse gases can disrupt this, with devastating consequences. It then looked at the way in which people on the local, national and international scale are affected by the onset of climate change and what we can all do to fight against it. The viable alternatives to fossil fuels were examined: ‘greener’ and more sustainable ways to power our planet and to provide people with the energy they need. The children considered the impact on their daily lives and how they would have to adjust and change their behaviours to live in a more sustainable way. From electric cars and hydrogen boilers to wind power and solar energy—they looked at ways in which we would all need to re-engineer and re-imagine our futures.

The expedition culminated with the final product for the expedition, the XP Climate Conference, to highlight the issue of climate change and the threats to Doncaster and the wider world in the future. Planned by the students, they delivered the keynote speech to delegates, which included the local council, members of parliament, industry professionals with an interest in sustainable energies and practices, the media and members of the public. Students then questioned a panel of experts, including the Shadow Secretary of State for Energy Security and Net Zero, for an understanding of the climate emergency and information on actions needed to tackle this on the local, national and international scale. Following the plenary session was a conference centre with various stands set up and manned by students, with information for the public on topics such as energy, energy production, fossil fuels, greenhouse effect, global case studies, emerging technologies, sustainable energies, renewable energy and climate change. Ways to tackle climate change were discussed, with local business leaders explaining their contribution to fighting climate change. The conference closed with statements and climate pledges to the audience.

Illustrative of the meanings made by the students involved in the XP Climate Conference are the speeches written and made by the students themselves (available publicly online). Florence, speaking to the impacts of climate change, presented the anticipated effects by 2050 and reminded the audience that it affected their town, their families:

This is not just some problem in a far-off land, Doncaster is also greatly affected by this scourge. The impacts already witnessed in Doncaster include floods

such as those in November 2019. In the village of Fishlake, to the Northeast of Doncaster, over 170 properties were impacted by these floods, including some teachers, students and families in our own school. If we don't act on this now, Doncaster could be almost entirely flooded.

(Florence, year 10 student)

Beth, speaking to a call for action, pointed to the many active and simple solutions for the 'average person' but the 'inconvenient truth' for governments:

The perception is that we have to rely on the government, in every country, to actually stir change on mass. I would suggest that ordinary people can do this, as we have more power than we know. If we just turned around and said, 'no', then what could the government do then? We need to be activists, we need to protest, and we need to use our voices against authority, against all the crass justice systems, against corporate capitalists and against the indifference that is shown throughout wider society.

(Beth, year 10 student)

The approach taken in the Climate Conference and across XP schools involves the community, 'to do good' for the community. Hoath and Dave (2022) refer to this as outreach and stress the need to make this meaningful. Contexts where children are stewards of the community, of the planet and each other provide the basis and source of this meaning. Learning in this context is deepened through an active and inquiry-based approach that promotes both science knowledge and problem-solving skills. The design for learning of the integrated curriculum at XP connects and contextualises subjects through learning expeditions to deepen learning, and to make knowledge more powerful (Pountney & Said, 2018).

DISCUSSION

It is perhaps ironic that the notion of talking about the weather, previously viewed culturally as a quintessentially British mode of inconsequential and neutral form of conversation, whose purpose was essentially to maintain social relationships, has now taken on such dark overtones. Thus, once phatic communion between people has transformed into transactions that are political in the sense that they relate to global affairs. We are reminded of Dewey's (1900) view of politics as productive and generative and his notion of socially organised intelligence (p. 29) and the need to act in creative ways for social justice—an intelligence based on critical awareness of social problems (Dietz & Davis, 2007). Notable in the response by XP schools is the importance of storytelling to create meaning, in which the expedition *Power to the People* provided a narrative for forging personal and collective identities, as a new social psychology of climate education (Stoknes, 2015). It rests on a logical examination of the issues that draws on Dewey's power of reasoning, in the way that the 'nominal' concepts of the weather and temperature become the 'genuine' concepts of climate change and its effects, formed and transformed by experience, reflection and activity. As Huntley (2020) reminds us: 'The challenge is to strike the right balance between presenting the (overwhelming) scientific facts and inspiring the emotional and social impulse to act'. Here, the aim is to foster multidimensional thinking that is equal parts critical, creative and caring. Returning to the involvement of children in protests, discussed in the introduction, one is reminded of the principle that protest is about resisting change, while advocacy is about trying to understand and create change.

However, while attempts to set out a climate literacy statement such as that by the Earth Day Project² are activist in the sense that they are a call to action, they stop short of providing a semantic schema for conceptualising and understanding sustainability and climate issues. For example, while the eight action points (APs) of the statement call for all schools and universities to give access to climate change-related courses in their programmes (AP1) and equitable access for all (AP2), available to all (AP3) and integrated across disciplines (AP4), the means of ensuring this is not clear. Furthermore, the training of teachers in climate literacy (AP5), to deal with climate anxiety (AP6) and promote active citizenship (AP7) and promote innovation and infrastructure (AP8), provides a direction but not the map or compass of how to get there. To pedagogise these action points, and translate them into the activities that engage learners in the ways discussed above, we require a theory of change, an activist one. Such a theory promotes a powerful pedagogy because it builds on the notion of knowledge that is powerful (Young et al., 2014, p. 74): 'if it predicts, if it explains, if it enables you to envisage alternatives'.

One approach that is gaining ground is Maton's (2013) semantic dimension of legitimation code theory, an elaboration of Bernstein's (1990) knowledge code theory. Maton's semantic theory differentiates two dimensions of meaning: the first is closeness to context (semantic gravity) and the second is the degree of conceptual complexity (semantic density). By means of this theory, learning activity in climate education can be characterised by a closeness to context, and the practicalities of action. Maton (2013) refers to this as a strong form of semantic gravity (the relative context dependency of meaning). The child talks about her concrete actions, the things she made and her preparation, and explores this through activity, including play. The teacher introduces various concepts including 'habitat' and the 'language' of the environment. This point in the exchange is a weakening of the semantic gravity (in other words, it becomes more abstract) and a strengthening of what Maton conceptualises as semantic density (in how the meanings become more complex and interrelated). For example, the notion of 'seasons' is dense and abstracted because it references not only the concept of weather but a number of other concepts such as time. In this sense, the teacher's use of the word 'climate' can be quite vague and circumspect (it remains tacit), and its broader inferences may be lost on the child. In the language of older children discussing the environment (as in the XP Climate Conference), one can observe a less-gradual decrease in semantic gravity (the conversation becomes more abstract and further from context more quickly) and a steeper increase in semantic density (there is a more rapid rise in the complexity of the language used). These shifts in meaning can be shown as a semantic profile of this activity, making accessible the way, in this context, knowledge is deepened, cumulatively, over time.

The semantic variation of an activist curriculum, therefore, involves a semantic shift from the context (stronger semantic gravity)—in the way that Florence talks about the effects of the floods in Doncaster—towards the abstraction of these ideas as what constitutes action (weaker semantic gravity)—in the way that Beth talks about governments and their responsibilities. Drawing on Dewey's discussion of nominal and genuine concepts (see above), nominal concepts (e.g., in the expedition learning target 'I can describe energy changes in a system and the way energy is stored') lead to the genuine concepts in 'I can suggest viable alternative sources of energy and explain why these will offer a more secure and sustainable energy for our planet'. This deepening of meaning is a strengthening in semantic density because it connects more concepts, in increasingly complex ways. This is the semantic profile of the *Power to the People* expedition—a shift, or wave, between context and meaning, made public in the XP Climate Conference. Meaning-making is undertaken by and with students, in the connections made between context and powerful knowledge about the climate, that is relevant and authentic but also purposeful. It also takes place over time, as the emergent outcome of deliberation as conceptualisation (Dewey, 1933), where concepts,

as established meanings or intellectual deposits, are used to found a better understanding of new experiences; they are what makes any experience educationally worthwhile. Central to this is the notion of philosophy and children's capacity to think about and philosophise the world and their place in it (Laverty, 2016). In this sense, learning is both democratic and democratising (Boyte, 2003).

CONCLUSION

Bernstein (1967) argued that, in shifting from closed to open, the boundary between the school and its community is differentiated—formerly sealed off and self-enclosed, the school becomes physically open in form, with porous boundaries between the home, the school and external experts. The concept of open schools provides the means to examine the organising principles of practice operating in climate education as a series of shifts from relatively closed to open and back again, over time. Here, the social conditions for a change in the social order of schooling are a change in emphasis in some of the main features of the school: '... the forms of social control, the division of labour among the staff, the curriculum (especially how subjects are viewed), the pedagogy and how teaching groups are organised' (Pountney & McPhail, 2019, p. 483). Thus, the shift to learning about and being active in climate education, albeit out of necessity, can be characterised as 'becoming more open'. 'This means schools, universities, and other educational sites becoming public and political spaces, as well as John Dewey's social ones' (Boyte, 2003, p. 12).

Building on an analysis of cases, this paper examines what schools and teachers can do to develop children's understanding of and engagement with the issues of climate change, and to address their concerns, illustrated with examples from a global movement in climate education and a specific case of curriculum development in a group of schools. The systems of meaning in these contexts have been made accessible, illustratively, to make a case for how the SDGs of quality education (SDG4) and climate action (SDG13) can be achieved, including the design of the curriculum by teachers. The possibility of an activist curriculum has been considered, one that is integrated and embedded rather than added on, in which young people can engage with and respond to the issues that they face. The case for such a curriculum posits the school as both democratic and open, in the sense of having boundaries that are fluid and permeable to the concerns of society, while also giving access to disciplinary knowledge that is the basis of conceptual understanding of the problems of, as well as the solutions to, climate change. Importantly, it implicates teachers in the design of the curriculum and the means of evaluating it, where 'to be a teacher is to be actively engaged in a social movement that is shaping the future of our society and our world' (Gorlewski & Nuñez, 2020, p. 14).

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CONFLICT OF INTEREST STATEMENT

The author is Chair of XP School Trust and a member of the Advisory Board of Take Action Global.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this paper as no datasets were generated or analysed during the current study. The quoted extracts and details of the cases are published in the public domain by XP School Trust and Take Action Global.

ETHICS STATEMENT

Ethics approval was not required for this paper.

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Endnotes

¹ Teach the Future (<https://www.teachthefuture.uk/teacher-research/>).

² Earth Day Climate Literacy (<https://www.earthday.org/campaign/climate-environmental-literacy/>).

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