



Heartwood 2

More voices from environmental
education: *Academic research
meets head, heart and hands*

Editors: Melissa Glackin, Shirin Hine, Sophie Perry



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Foreword

BY LULU HEALY

Heartwood 2: More voices from environmental education: academic research meets head, heart and hands is the second volume in the *Heartwood* series, produced by members of the MA in STEM Education, a programme situated in the Centre of Research in STEM education (CRESTEM) of King's College London. The STEM acronym is usually associated with Science, Technology, Education and Mathematics, but in CRESTEM the letters can also stand for others, such as Sustainability, Social Justice, Tinkering, Critical Thinking, Environment, Equity, Making and Modelling. This broader view of conceiving of STEM as more than a collection of academic disciplines shines through the ethical and equitable approaches to education presented in *Heartwood 2*, as it contemplates the challenges involved in developing a meaningful environmental education that attends to issues such as climate change, biodiversity loss, their changing, precarious nature, and the role of the human species in contributing to this precarity.

Much of the official STEM-related discourses still focus on its role in increasing economic productivity, without attending to the social and ecological injustices this may fuel or to the destructive forces that underpin dominant, human-centred industrialised societies and systems. Similarly in schools and universities, government policies related to STEM education focus heavily on preparing future generations to develop the skills to contribute to economic growth (and national dominance). This book offers different ways of viewing, and of doing STEM Education – ones in which we might learn to harness STEM knowledge and practices in sustainable, ethical ways, in which the networks of dense and interdependent relations between communities and the human and non-human

“Much of the official STEM-related discourses still focus on its role in increasing economic productivity, without attending to the social and ecological injustices this may fuel or to the destructive forces that underpin dominant, human-centred industrialised societies and systems.”

entities (be they biotic or abiotic) are recognised in school and university curricula, and where we do not shy from addressing the dangers of artificially separating human from ecological concerns.

This view is also rooted in the creative pedagogies and assessment methods of the MA STEM Education module on *Environment, Sustainability and the Role of Education* from which this book emerged. In addition to the university setting, sessions of this module also take place in one of London’s Ecology Centres, and throughout all sessions, participants, as the title of this book indicates, are invited to think with their heads, their hearts and their hands. The chapters of the book, too, take the reader into a variety of education settings: primary, secondary and higher education contexts are considered, as are less formal education experiences such as a local community gardens, charities which bring outside issues (farming and civil engineering) into schools, and forest schools.

In the first chapter of the first *Heartwood* volume, readers were encouraged to listen to the heartwood of trees and to hear its knowledge, its wisdom. As I read the chapters of Volume 2, alongside listening to the human voices, and the sense of urgency they expressed, I found myself recalling the rising voices of the wind and the rain in my own life in recent years. At times, they seemed to express an anger, a sense of fighting back, dissent, and a refusal to be tamed to serve the desires of the most privileged of the human species. It was in the wind and the rain that I heard – and felt to my very core – the desperate need to change our world. The wind and the rain confirmed that a world in which some people matter more than other people, and certainly more than animals, plants and other elements of nature, is not ultimately sustainable. But the wind and the



rain didn't speak about how to educate otherwise, or to the role of educators in challenging rather than (re)producing such hierarchies of mattering. The voices of the *Heartwood* series do.

In the first volume, the call for systemic change was loud and clear. So too in *Heartwood 2*, with the constraints imposed by the educational organisations and the wider political configuration of the system as a whole are palpable throughout this volume. Alongside the urgency, the chapters also document the shared desire to do more – while they also illustrate how what can be done is not independent from the context of actions. It was impressive to read of the different strategies used to negotiate the constraints imposed in some of the settings the essays explored, particularly by currently prescribed curriculum and assessment regimes. Some examples of the strategies developed in spite of these barriers to action reminded me of what has been described as *creative insubordination*, a practice in which, driven by ethical concerns, teachers find ways to circumvent aspects of constraining policies prescribed from above in order to provide meaningful learning experiences aimed at empowering their students to engage with issues that might impact on their future wellbeing¹. Or perhaps they could be envisaged as what Greer *et al.*² call *infrapolitical dissent*: hidden or 'off the radar' actions, not openly aimed at challenging power but which nonetheless dilute or resist dominant norms and discourses to create possibilities for alternative ways of thinking and doing.

And finally, care:

"...care is everything that is done ... to maintain, continue, and repair 'the world' so that all ... can live in it as well as possible. That world includes all that we

seek to interweave in a complex, life-sustaining web.”
Puig de la Bellacasa³

This notion is central to all the chapters. Of course, there are many ways to conceptualise care, but for Puig de la Bellacasa, care is understood as a joining together of an emotional involvement with the cared-for, practical doings (caring for rather than concern about), and “an ethico-political commitment that affects the way we produce knowledge about things”⁴. These three components play out in different ways in the different contributions to the book, but I felt them all jumping out at me from the pages. How very difficult then for teachers who, as two of those who work in secondary schools remind us, are required to remain apolitical – does that imply they should not adopt an ethico-political stance, and be forbidden from caring? Puzzling indeed.

For me, *Heartwood 2*, and the invitation to write this foreword, is a parting gift as I prepare to leave CRESTEM and London and return to Brazil, inspired to listen to the heartwood of the trees in the southern hemisphere, and to live in and with part of the remaining forest of the Serra da Mantiqueira in São Paulo. What a wonderful leaving present. H

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June 2024

¹ Gutiérrez, R. (2016). Strategies for creative insubordination in mathematics teaching. *Teaching for Excellence and Equity in Mathematics*, 7(1), (pp.52–60).

² Greer, K., King, H., & Glackin, M. (2023). ‘Standing back’ or ‘stepping up’? Exploring climate change education policy influence in England. *British Educational Research Journal* 49(5): 1088-1107. (p. 1103).

³ Puig de la Bellacasa, M. (2017) *Matters of Care: Speculative Ethics in More Than Human Worlds*. Minneapolis, MN: University of Minnesota Press. (p.161).

⁴ Puig de la Bellacasa, M. (2011) *Matters of care in technoscience: Assembling neglected things*. *Social Studies of Science* 41(1): 85–106. (p.44).

01

Heartwood 2

BY MELISSA GLACKIN, SHIRIN HINE, SOPHIE PERRY

Melissa, Shirin and Sophie are the editors of the two *Heartwood* essay collections.

Welcome to *Heartwood 2*, our second essay collection, where our authors emerge from hefty environmental education academic research literatures to communicate to you: their friend, partner, colleague or fellow traveller on the environmental education (cycle) path. This collection, like its predecessor, *Heartwood'*, invites our students, alumni and colleagues to take courage and listen to their hearts, as they speak about the environmental and biodiversity crises from their personal and professional – rather than purely academic – perspectives.

Academic prose, in its delivery of important, complex and sometimes frightening knowledge, is often dense and detached. In the field of environmental education research, this can lead our thinking (and writing) to become disconnected from our emotions. But whilst we might be able to place these emotions in a box, stacked away on the top shelf, they are still there. Meanwhile, we read and write about how our beautiful planet, and the humans and other species that inhabit it, are suffering. We read and write about multiple research projects and the new and improved methods, models, and modalities to approach educating for the crisis. We read and write about the enormity of this task and the many obstacles to implementing the required changes within and beyond the

education system. As we do this, for many of us, the fears, anxieties and frustrations we have locked away inside the box continue to grow but, classified as not for academic consumption, they remain voiceless and neglected.

Lines of separation

Our instinct, as humans – and especially as researchers – is to locate dividing lines in order to group and classify. We are more at ease when ideas are lined up, ordered and neatly categorised. However, in practice, these boundaries are never clear. Look again, and our organised groups frequently collapse as clusters blur, leaving defining themes to morph into unifying ideas. Disorganisation, whilst provoking feelings of uncertainty and sometimes fear, can act as a useful reminder of our agency in the creation of rules and groupings. The same can be said for the boundaries we create between our heads, our hearts and our hands when we privilege certain (academic) forms of knowledge over our emotional and physical responses. If we want to embody the changes proposed by the academic literature to contribute to a meaningful environmental education, then we will also need to incorporate multiple types of knowing, whilst acknowledging the discomfort this can bring, for the divisions between our heads and our hearts to dissolve. That said, this synergetic work requires an appropriate space. This work takes place inside us as well as through the worlding of the words out onto the page, and can be difficult to express within the confines of academic writing. By encouraging each other to write about our research from the heart – as well as using our hands to express our ideas creatively through accompanying artwork – the essay collections within *Heartwood*, Volumes 1 and 2, go some way to providing both the opportunity and the space for this work.

Ha! But boundary-making is never far away – for, whilst often a curse, it is also an important tool. As editors, we identify themes that connect and differentiate our essays, in the wish to bring order to our collections. In *Heartwood* Volume 1 we approached this by creating three preordained categories: essays exploring educators' perspectives, young people's perspectives, and the role of organisations. All the essays were required to fit into one of these. However, each contribution did much more than its category label. Indeed, in the final chapter of *Heartwood* Volume 1 we draw out three important commonalities threaded through our essayists' concerns for environmental education, unifying their voices. The first of these was 'despair meets hope' where authors, once given a license to speak from their hearts, expressed the



dependency observed in the students they taught, and their frustration towards the curricula that bound them. Hopefulness, however, was always in the wings – in the experience of alternative practices through to optimism in the groundswell of calls for a better, sustainable society. The second thread was the importance of reflexivity in practice: the need to examine our feelings, reactions and motives – and therefore our reasons for acting. There was a palpable sense from the authors of the first collection that to sustain our work in this area, several (often uncomfortable) truths needed to be held: meaningful intentions don't always translate into authentic practice, compromises need to be made if we are going to continue this difficult work, and good intentions can unwittingly result in problematic outcomes. Resulting from these two themes, the third shared theme was the common call for educational and societal system change.

Lines that connect

Reflecting on our first volume of *Heartwood*, and particularly its calls for change at an institutional level, we began this second essay collection with less dogmatism: reducing the need to control and applying greater reflexivity. We didn't establish initial themes: keen to see once seeds were sown, and regularly watered, what might be harvested. We were not disappointed and share here a bumper yield of essays and their accompanying drawings. Eleven essays have been lovingly nurtured by alumni, PhD students and staff all connected with the *Environment, Sustainability and the Role of Education* (ESRE) module, situated within the Master's degree in STEM (Science, Technology, Engineering, Mathematics) Education at King's

College London. The module was established to open up students' thinking, to go beyond accepted practice, and to critique the dominant discourses embedded in environmental education and its related practices. The essays do all of this and more. Indeed, as writing progressed and our authors drafted and redrafted, we recognised the theme of 'restriction' connecting our essayists' ideas. So, whilst on constant alert to our inherent need as editors to control, we've loosely assembled the chapters into three sections concerning 'restriction': Working within restrictive systems: seeking routes for action; Working beyond restrictive systems: alternative practices and values; and Bridging the gap: working within and against restrictive systems.

Working within restrictive systems: seeking routes for action

This section hears from educators who reflect on the limitations of the current approach to environmental and climate change education within schooling. Each chapter author highlights opportunities to stretch, subvert or tweak a restrictive system.

In Chapter 2, *Educating the Heart and Hand*, Tom, a maths teacher, reflects on his own position, and potential power, as a teacher who cares about the environment while simultaneously contributing to the crisis at hand. He considers how education might do more than inform learners about climate catastrophe, since knowledge of our consumption has done little to halt it. Instead, he suggests embracing educational approaches that engage the hand to offer practical solutions alongside opportunities for heartfelt recognition of the need for change.

Lucy, in Chapter 3, builds on ideas Tom identifies concerning inherent restrictions in the current schooling system, and shares her MA research on primary teachers' views on carbon literacy, a key aspect of the Department for Education's 2022 strategy on sustainability and climate change education. Lucy explains that while, as a teacher, she initially harboured doubts about the strategy's usefulness, her research findings offered hope. She shares that teachers' views on carbon literacy, and their appetite to engage with it, far outstrip the vision of it within governmental strategy. The chapter offers recommendations to support the important work of teachers who, as inherent problem-solvers, deliver vital environmental and climate change education in contexts that can often be limiting. In Chapter 4, Melanie, a teacher and teacher educator, extends Lucy's observations to consider the viewpoints of secondary school teachers working in the context of a restrictive educational system.

In highlighting the shortcomings of a knowledge-focused approach to climate change education, her work explores teachers' appetites for an alternative in the form of action-oriented learning at whole-school level.

This section, and its exploration of the ways in which those who work in constrained systems are actively seeking and unearthing knowledges, practices and values that push the boundaries, draws to a close with Caroline's contribution. Chapter 5 takes us beyond the realm of schooling, as Caroline reflects on her work as an Education Manager within a civil engineering charity. In *What is the role of civil engineering when the world is on fire?* Caroline questions the history of civil engineering, what it is now, and what it might become as its role reconfigures in the face of climate and environmental crises.

Working beyond restrictive systems: alternative practices and values

This second section looks beyond the tools readily available or obvious within mainstream education and considers how alternative approaches can offer important counternarratives and practices necessary to address environmental issues within education.

In sharing findings from her MA study into children's plant awareness in Chapter 6, Rachel, a primary school teacher, highlights the curriculum's role in fostering a utilitarian view of plants within human-centred hierarchies. However, her research reveals the depth of children's emotional connection to plants, and the excerpts she includes are not only moving to read but contain valuable lessons for rethinking our relationship with other species. The need to shift dominant value hierarchies is explored further by Nadia, a secondary school teacher, in Chapter 7. Her MA research considered the effects of different educational interventions on students' environmental attitudes and their underlying values. While the student responses she shares initially seem less hopeful, her study illustrates the potential of alternative pedagogical approaches, including forms of activism, in successfully shifting students' egoistic values further towards altruism.

Looking beyond the classroom to outdoor/specialist educational settings, Shirin, in Chapter 8, reflects on observations of neurodivergent learners in Forest School, conducted as part of her PhD research, and considers the lessons this approach – and the varied forms of environmental learning it facilitates – might hold for environmental education more broadly. She argues that, in addition to learning from 'alternative' approaches such as Forest School, the contributions of learners often

marginalised within the mainstream education system are an essential part of developing a holistic educational response to the environmental crisis.

Importantly, the approaches explored in this section, though considered alternative or radical and, as such, often overlooked or marginalised within mainstream education, are all achievable within the classroom. These chapters show how, even in apparently small ways, such approaches can usefully inform environmental education by learning from and incorporating the wider range of perspectives needed to address current crises more effectively.

Bridging the gap: working within and against restrictive systems

The final section brings together stories from authors who are applying insights from environmental education research to the systems they work within as they attempt to shift the dial towards an ethic of environmental care.

In Chapter 9, Kavita, coming from a rich and varied career in education, sets out how, upon starting her Master's, she questioned the usefulness of theory to deepen her practice. Through her chapter, which takes us from environmental education teaching in India to a volunteering session at a community garden in London, Kavita describes how the theory she encountered during the ESRE MA module supported her to connect dots, see patterns, and reflect on past and current practices. Sophie, in Chapter 10, also considers the relationship between theory and practice by reflecting on her own journey of shifting between the two. In *A spiral of environmental education: theory to practice (and back again)*, Sophie sets out how both theory and practice make demands of one another and, as such, are both crucial aspects of much-needed systemic change.

In *Doing More...*, Heather explores her role as a professor and experiments with bringing climate and environmental issues to the fore within the academy. Chapter 11 sees her describe herself as a "human shoehorn", going beyond her realm of comfort to ensure that climate and environmental crises are acknowledged, not ignored, in meetings, lectures, seminars and supervisions. Finally, in Chapter 12, *Feeling the research in our hearts and guts*, Melissa shares her rollercoaster ride of making space for transformative and embodied practices within the Master's programme, delivered in our formal and traditional university setting.

Collectively the essays in this third section illustrate how theory can be freed from the academy and activism can be welcomed in, transgressing the lines that separate head from heart, theory from practice and people from nature.

Heartwood 2: unleashing restriction and inviting your responses

This chapter has offered a loose map to the essays within this collection, which we hope will support you to go forward and explore them. The themes and intricacies we collectively address will land with each of you differently, and so, in an attempt to relinquish control, we have not pre-determined the destination of this journey. At the end of this collection, a final chapter does not round up the themes or present a summary. Instead, we have left an empty page, on which we invite you to doodle or write your own conclusion. *What has spoken to you as you've read our chapters? What connections have been made? What new questions have been seeded? And how might they look and feel in your heart, your head and your hand?* **H**

¹ Glackin, M., Hine, S., & Perry, S. (Eds.) (2023). *Heartwood: Voices from environmental education: Academic research meets head, heart and hands*. King's College London.

02 Working within restrictive systems: seeking routes for action

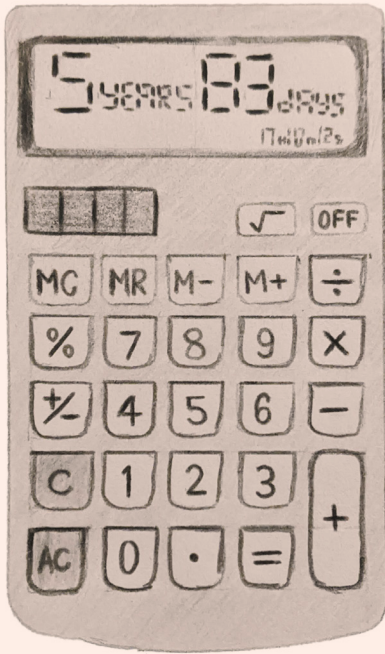
Educating the Heart and Hand

BY TOM GATENS

Tom works in a state secondary school in Central London as a maths teacher from Year 7 to 13. He is obsessed with how to make the school day as enriching an experience as possible, through engaging pedagogy, thoughtful subject content choices and a variety of extra-curricular offerings!

One of the semi-permanent exhibits in the Design Museum in London is a clock counting down to the moment at which global temperatures will rise to an irreversible level¹. On 21 July 2029, experts predict that the Earth's temperature will be, on average, 1.5°C higher than pre-industrial levels. Leading climate scientists believe that this level is the threshold that, once surpassed, will trigger unavoidable, widespread and irreversible climate catastrophes. This clock, set amongst a selection of 'things' that humanity has designed, is a stark reminder that our time on the planet as a species is rapidly diminishing, unless we take significant action immediately.

There is certainly some irony to where the clock is placed. The Design Museum contains exhibitions on fast fashion, mass production of electricals and other items symbolic of consumer capitalism. It is not hyperbole to say that the rate of this countdown clock would be drastically slowed had these inventions, and the consumerist ideals that they brought with them, been more considerately crafted. As it stands, this countdown to environmental doomsday being surrounded by single-use objects which took masses of fossil fuels to create is a startling hypocrisy.



"Sir... Why does my answer keep getting smaller?"

It is, however, emblematic of a larger-scale contradiction. I myself am a hypocrite – as is anybody who is outspoken on the topic of the climate to some degree. A product of my generation, I very rarely check if the food I am eating is in season or out of season, I buy new products rather than make do or mend, and I fly across the world for holidays. The fact that I wash out sauce pots and jars before recycling them and use recycled toilet paper is perhaps completely overshadowed.

But this hypocrisy does not stop me believing I can be a role model for future generations, nor do I believe it should. Yes, I point out the flaws and the destruction caused by society and consumer capitalism while being a member of that very system. But if we only allow the perfect, carbon negative, non-polluting population to speak then the conversation would be silent. It's a Catch-22. We must fix this broken system, but if we ignore anyone even slightly hypocritical then we will lack the power to criticise the system from within.

“From studying books by environmentalists in English, or exploring projects on reforestation in modern foreign languages, the scope is more far-reaching than we may realise.”

The population of the future needs to know that every green act is a good act, and we should not lambast others for the self-fulfilment of indulging in capitalism. Wherever you place yourselves on the sliding scale from simply recycling to living in Walden Forest² does not matter. The most important thing is understanding where the next step on the scale is and being aware of how to get there. But in speaking about understanding and awareness, I am speaking about education. Which is where I, and 570,000 others come in.³

As I stared at the countdown clock, I began to wonder if I was doing my job as an educator – a secondary school maths teacher, to be precise – as well as I could be. Teachers are under constant scrutiny and have ever-changing requirements. Raise the attainment floor, narrow the attainment gap, stretch the very best, accommodate all special educational needs, embody “British values”, and lastly (potentially most puzzlingly) remain apolitical. We have curriculum to cover, formative and summative assessments to create, set and mark, references to write and behaviour policies to rigorously adhere to.

I adore my job and struggle to think of something else that I would rather wake up at 6:15am for, let alone have my lunch break interrupted by terrible excuses as to why a Year 9 hasn’t done their homework. But I do wonder if I still truly believe in the message I am being asked to convey. I preach the beauty and sophistication of mathematics to all who will listen, but nagging in the back of my mind are all the lessons I am not teaching. I stomach it by maintaining that giving students a broad and balanced curriculum will give them the greatest freedom in future. A freedom to choose careers and hobbies that are of interest to them and can let their talents shine through. But what if that future is as warped as the bleakest climate predictions make out? How free will they actually be?

The reality is that something needs to change. The current strands of environmental, climate or sustainability education in schools are bound so tightly to theoretical knowledge and recall that they may be lost in the sheer volume of content. In the past fifteen years, education has become focussed on offering a “knowledge-rich” curriculum⁴, under the premise that skills and critical thinking are just knowledge and facts repackaged. Our school day now consists of a deluge of facts, divided into subjects and taught in a ‘repeat after me’ fashion. Environmental education falls into this, as being able to cite the causes and effects of climate change feature in the science and geography curricula. If this doesn’t change... “Repeat after me – we are all doomed.”

Knowledge recall may be beneficial to students passing exams, but in bringing about the behavioural changes needed to slow down climate change, the benefits are next to zero. Knowledge is so easy to ignore and overlook – evidenced every time you throw a piece of plastic away out of convenience instead of recycling it. Knowledge is constantly updating – for example, oat milk, widely considered the green alternative to dairy, is now under scrutiny for the quantity of fuel needed to make one carton⁵. Knowledge can be manipulated – we are up against an advertising and marketing machine that urges us to consume, consume, consume. What we know, the corporations know too. A visit to the Design Museum will show you intricate and clever design and convenience can appeal to us in the form of new-fangled gadgets and devices which are only marginally better than the previous iteration but command our attention. And, of course, we give in. It is all we have ever known. Consume. Consume more. Consume better.

But if a knowledge-rich environmental education is not the answer, then what is? Our society has long looked down on specific skills, like compassion, creativity and manual abilities, as many industries prioritise facts and cognition. David Goodhart's *Head, Hand, Heart*⁶ details the scale of the problem and highlights the imbalance of societal value between Head-centric occupations and those which more frequently use the Hand or the Heart. The head has been used to help us recognise problems, a necessary part of education. But now action and compassion must take precedence. If the world is going to change, then education needs to change. Accordingly, educators must now embrace the Heart and the Hand alongside the Head.

The art of teaching can be split into two main fields. What we teach (curriculum) and how we teach it (pedagogy). To improve environmental education requires addressing these two facets. If we are honest, many subjects lack a curriculum that is progressive and forward-thinking enough to deal with the issues of today, let alone tomorrow. While addressing climate change is more difficult in some subjects than others, if time allows for a rethink, it can be accomplished. From studying books by environmentalists in English, or exploring projects on reforestation in modern foreign languages, the scope is more far-reaching than we may realise.

Admittedly, in my six years of teaching, I have only successfully managed to link the specific contents of the maths curriculum to the environment in a lesson on percentages and estimates. It involves students calculating their own carbon footprint and working out which one

“Rather than skirting around the hypocrisy of promoting green actions, we should confront it head on by encouraging students to think critically about the systems that we exist in”

thing they could do to have the greatest effect on their own impact. It still felt like a deviation from the norm to the students, though. An applicability beyond just getting good grades. A reason to study beyond praise and achievement. For once, they were thinking about their future not just through the lens of “what do I want to be when I grow up?” The only reason I have not done more lessons like this is because of how constrained and limited my time with each class is. I have to balance them passing their exams and allowing them the freedom to enter the working world, with my worry and fear that by the time they get there, the world will be a very different place.


A Head, Hand and Heart curriculum could offer an alternative. As teachers, we should be ensuring that every lesson and learning opportunity offers the chance to connect with nature and the world around us. I think this could be done without too much stretch in the national curriculum, if we encourage students to feel part of a worldwide system and show them that they have the individual power to make a difference. We should be planning activities that allow students to feel part of their small community by collaborating to solve problems. Their voices should be heard, so that they will see actions drive outcomes in communities. If students feel empowered and emboldened by small actions taken on a daily basis, their inclination to take personal green actions will surely increase.

As students learn by emulation, the teachers and other adults in the school need to embody positive green values too. We should be taking every possible opportunity to link a lesson to the climate – with more time devoted to planning these lessons. Rather than skirting around the hypocrisy of promoting green actions, we should confront it head on by encouraging students to think critically about the systems that we exist in; their benefits and their pitfalls. We should constantly remind ourselves that we do not need to nurture a generation of vegan activists who live with very little to avoid being a part of the big system. As Anne Marie-Bonneau (known as the Zero-Waste Chef)

says: “We don’t need a handful of people doing zero waste perfectly. We need millions of people doing it imperfectly”⁷

To regurgitate facts, in order to pass exams, in order to get into further academic study, in order to get a job seems to be a way that a student can progress in their own life with minimal disruption to the systems at play. A head-centric, knowledge-rich curriculum will leave us in a scenario where we all are aware of our impending doom but do not have the practical and creative skills to avoid it. An education which focuses on manual skills, once a symbol of British industrial education, could help to nurture individuals who feel competent enough to break the cycle of mass production, while offering benefits to wellbeing⁸.

Engaging the hands through critical pedagogy is difficult but this time we do not need changes to pedagogy – we just need an updated curriculum. Design technology has battled against negative stereotypes for many years and many schools now no longer offer it, as it is seen as a low-status qualification. But, if modified, it could play an important role in a sustainable future. Textiles and embroidery can show students how to mend and repair instead of polluting the environment with more fast fashion. Food technology should incorporate a study of how and where our food is grown and the effects our dietary choices can have on the planet. Resistant materials could be overhauled too: units on upcycling and recycling of single use plastics could mean that the next generation are designing products that take us forwards, not backwards. For those who think education is all about preparing students for the working world: we need to face the reality that we need workers with the skills and imagination to transform – rather than conform to – our current systems of consumption.

In fact, maybe the Design Museum is the perfect place for this all to start. Design is truly where Head, Hand and Heart all meet – the intersection at which I think our education system should exist. The irony of counting down to our doom while celebrating all of our historic and incredible achievements is a juxtaposition that typifies the whole issue. One day I will organise a school trip there and take students to see the wonderful innovations that human beings have produced. I know that, one way or another, the clock will eventually no longer be there. It is up to us whether this is because it is no longer relevant or because we ran out of time. 

- ¹ ClimateClock.World. Available at: <https://climateclock.world> [Accessed 10 May 2024].
- ² Walden Forest – the location for Henry David Thoreau’s reflection on living in simple natural surroundings away from the systems put in place by humanity.
- ³ TES Magazine. 18 January 2024. How many teachers are there in the UK? Available at: <https://www.tes.com/magazine/analysis/general/how-many-teachers-are-there-uk-england-scotland-wales-northern-ireland> [Accessed 10 May 2024].
- ⁴ Department for Education. 21 July 2021. The importance of a knowledge-rich curriculum. (Speech). Available at: <https://www.gov.uk/government/speeches/the-importance-of-a-knowledge-rich-curriculum> [Accessed 10 May 2024].
- ⁵ Coffey, H. 5 February 2024. The rise and fall of oat milk: Has the trendiest dairy alternative finally fallen from grace? Available at: <https://www.independent.co.uk/life-style/food-and-drink/features/oat-milk-nutrition-dairy-free-b2489539.html> [Accessed 10 May 2024].
- ⁶ Goodhart, D. (2020). Head, hand, heart: the struggle for dignity and status in the 21st century. Penguin UK.
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03 Working within restrictive systems: seeking routes for action

Primary teachers want to educate pupils about climate change – let's help them!

BY LUCY INNES

Lucy is a science teacher who teaches both primary and secondary science. She recently completed her MA in STEM Education at King's College London. Her research focussed on primary school teachers' conceptualisations of carbon literacy and the role this could play in climate change education.

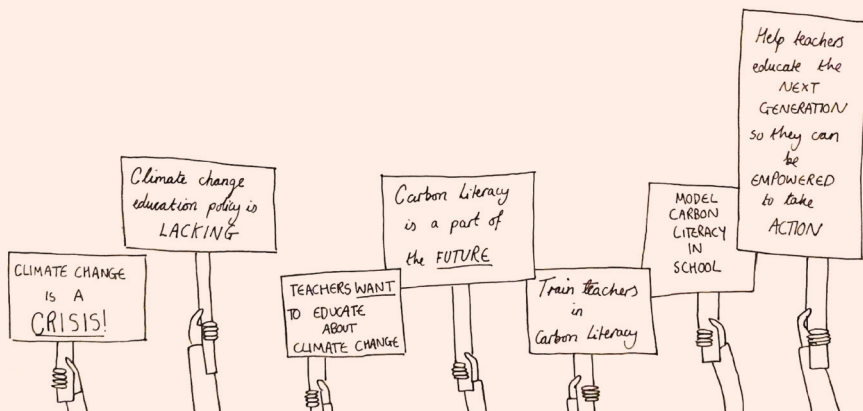
Climate change is undeniably one of the biggest crises facing our planet today, but climate change education in England is limited and research has found that the policy guidance surrounding it is lacking¹. As a (primary and secondary) science teacher who feels very passionately about the importance of climate change education in schools, my heart filled with dread upon reading the latest climate change education in schools policy² to see that the main focus of knowledge development surrounding climate change education for teachers was carbon literacy. There are already so many different types of literacy within the primary classroom today: reading literacy, computer literacy and health literacy, to name just a few. I was worried that the policy paper was a wasted opportunity, another chance that had not been utilised to upend the way climate change education was currently addressed – or not addressed – within the English primary classroom. However, I was interested to see the emphasis the guidance placed on the development of teachers’ carbon literacy, starting in Early Years and primary school, as a key element to climate change education.

“by the end of my research I was unexpectedly optimistic about the future of climate change education within the classroom and the potential impact this could have on the young citizens and future leaders of our country.”

When exploring this area further, I discovered that the question of how primary school teachers conceptualise carbon literacy had not been studied before. So I chose to focus my Master’s dissertation research on primary school teachers and their thoughts around carbon literacy: what did they think carbon literacy was? What did they think would support or prevent them teaching carbon literacy? Despite my initial reservations about the policy framing of carbon literacy, by the end of my research I was unexpectedly optimistic about the future of climate change education within the classroom and the potential impact this could have on the young citizens and future leaders of our country. I found that this optimistic shift in attitude was due to three main causes: the teachers I spoke to were incredibly enthusiastic about including climate change education in their classrooms; their conceptualisations of carbon literacy were broader than more traditional definitions; and they perceived the barriers to including carbon literacy and climate change education within their classroom as surmountable – and offered thoughtful and innovative solutions to address these. In sharing a selection of my research findings below, I hope to convey this sense of optimism and illustrate the potential of climate change education.

Teachers want to teach about climate change

During my research, I interviewed seven state primary school teachers from a range of year groups and age ranges, none of whom were early career teachers, with an average of eight-and-a-half years’ teaching experience each. Over the course of these interviews, each teacher discussed, unprompted, their desire to be able to include more climate change education within the classroom. They offered a wide range of reasons as to why they felt teaching climate change in the primary classroom is so important. Some of these reasons were ones I had already considered as a science specialist primary school teacher,



such as helping to answer the questions children may have about climate change after hearing it discussed by their parents or on the news. One teacher, Drew, also mentioned the role of teachers in addressing misconceptions or misinformation surrounding climate change that may be spreading on social media:

"I also think that the pupils are really aware of this. They can ask some really interesting questions about this and so I think it's really important to be able to teach about it. I think also children get a load of their knowledge from social media like TikTok and stuff now, so I think it's really important to teach them accurate information as there is lots of pseudo-science and it would worry me that they would believe it all if they aren't taught about it in school."

I felt that this quote was an incredibly accurate representation of a fear that many teachers feel surrounding the misinformation that can be spread to their pupils, particularly online. However, the fact that Drew also felt he would be able to help address this issue illustrated the active role teachers were willing to take in considering their pupils' education beyond the classroom and ensuring access to high-quality, evidence-based information around climate change. Furthermore, some of the teachers offered suggestions I had never considered as reasons for teaching climate change. These included ideas about our moral obligation to educate the next generation about this topic, as several teachers mentioned in their interviews:

“It is a crisis and I feel like we, as teachers, have a responsibility to educate the next generation about it.” – Kai

“I mean, it is probably gonna cause massive problems with displacement of people, and it’s probably gonna cause wars and things to come and actually, I think we do a disservice to our students if we don’t actually give them a chance to make changes that might avoid at least some of that.” – Morgan

I found this point of view incredibly thought-provoking: these teachers felt that the teaching of climate change goes beyond its inclusion in the curriculum as a factual/scientific subject and is part of the responsibility they feel we owe the next generation. The passion that the teachers shared for the teaching of climate change education, all with differing but very valid reasoning behind them, was something I found truly inspiring; I think it shows that, with support from the government and the school system, climate change education could become an integral and meaningful part of how we equip children to deal with the climate crisis in ways that expand their perspectives and introduce holistic ways of thinking about this subject. The teachers’ sense of responsibility also indicated their commitment to their pupils’ ongoing education.

Teachers’ views of carbon literacy are all-encompassing

Whilst discussing the teachers’ ideas around the definition of carbon literacy, I found that their definitions were much broader than those normally used. Traditionally, definitions of carbon literacy discuss knowledge of climate change and the role that carbon emissions play in climate change, as well as ways to reduce emissions. The teachers’ definitions took this concept of carbon literacy further, including the role of modelling lower carbon emission behaviours at multiple levels, within the classroom and the whole school community.

“So like, we’re talking about just our individual class, how can we reduce things that actually, you know, the whole school itself and the site management team and the management team of the school might be able to make changes to reduce carbon as well.” – Morgan

I felt that the modelling of lower carbon-emitting behaviours across multiple levels was encouraging: not only could this show the children that they have the power to make small changes now, by doing things like switching lights off when they’re not needed, but it also shows them that communities can work together to make bigger changes, such as schools switching to motion sensor lights to decrease energy usage, or by using local produce in the lunch hall to decrease their school’s total carbon footprint.

“In their definitions of carbon literacy, the teachers also included the potential impact of students not only in the present, but also in their role as agents of change in the future”

In their definitions of carbon literacy, the teachers also included the potential impact of students not only in the present, but also in their role as agents of change in the future. As Parker commented:

“This has got to be beneficial from when they grow up and then head out into the world.”

I thought that this was a really positive point of view as, while acknowledging that children do not have a massive amount of control over a lot of decisions currently – such as how they get to school or whether their house has LED lightbulbs – it highlights that, in the future, if they have been educated about climate change effectively they may feel empowered to make more pro-environmental decisions. The teachers’ responses not only highlighted the importance they attached to equipping children with a feeling of agency in preparing them to act in the face of the climate crisis, but also showed a move away from an individualised stance and towards a wider, community-oriented perspective.

Teachers are problem-solvers

Finally, although the teachers were able to identify multiple perceived barriers into the inclusion of carbon literacy within their classrooms, they also came up with potential solutions to each of these barriers. The barriers they reported included: concerns about causing eco-anxiety in their children, lack of subject and teaching knowledge surrounding climate change, limited teaching time and the potentially restrictive content of focussing on carbon literacy. However, the teachers also felt that these barriers could be addressed through a variety of interventions. These included alterations to the national curriculum and assessment focusses, additional training for in-service and pre-service teachers, and the provision and sharing of models of how best to teach around climate change. Kai’s comment below illustrated this succinctly:

“I think I would also worry about eco-anxiety in the children so I feel like if we were to teach more about

“although teachers are aware of the limitations of climate change education, they are also inherently problem-solvers and so can describe solutions to their problems almost as quickly as they can identify them”


climate change then I would like some kind of training in how we could help minimise this.”

This quote is indicative of how, although teachers are aware of the limitations of climate change education, they are also inherently problem-solvers and so can describe solutions to their problems almost as quickly as they can identify them. Therefore, although the inclusion of climate change education within the primary school classroom may not be a smooth course, my study indicated that if teachers are given adequate support and time, they will be able to come up with the most effective solutions to the barriers they face.

Concluding thoughts

At the start of my journey into exploring carbon literacy in primary education, I felt relatively negative about the role it could play in climate change education. However, over the course of my research I have found that I have become increasingly hopeful about the ways carbon literacy could be used to develop the inclusion of climate change education in primary school classrooms and beyond. This optimism has mostly been driven by the acknowledgement of the importance of climate change education by all the teachers I spoke to, the innovative ways in which climate change is already included in their classrooms, and the ways they identified for these ideas to be further developed and built into whole school communities.

To support teachers fully in their endeavours to teach about carbon literacy and climate change, I feel that a number of changes need to be made. Firstly, all teachers should have professional development accessible to them, along with time to complete this training. This would help them develop not only their subject knowledge surrounding climate change but also ways of supporting their students’ mental wellbeing when tackling this potentially upsetting subject. Secondly, carbon literacy and climate change education should be linked into curriculum

and end of key stage assessment to ensure its inclusion in all classrooms. Finally, I believe that best practice models of how carbon literacy and climate change can be included in the classroom and within the whole school environment should be collated from a range of schools where fantastic work is already taking place, creating a set of resources from lesson plans through to assemblies; policies through to emails to parents/carers and the wider school community. Such resources could be used as inspiration for teachers and schools who are looking to improve their implementation and would reduce the workload of producing all these items from scratch. The use of real-life school examples would also ensure they are feasible within a school, rather than being written by someone who has not used them in a school environment. I now truly believe that introducing climate change education into the primary classroom, through carbon literacy, is a real priority. Although climate change is one of the biggest crises facing our planet, in our teachers we have a whole generation of people who are here and keen to educate the next generation about the crisis and its potential solutions. By adopting these simple measures, let's help them to help the planet! 

¹ Greer, K., King, H., & Glackin, M. (2021). The 'web of conditions' governing England's climate change education policy landscape. *Journal of Education Policy*, 38(1), 69–92. <https://doi.org/10.1080/02680939.2021.1967454>

² Department for Education (2022) Policy paper: Sustainability and climate change: a strategy for the education and children's services systems. London: DfE. Available online at: <https://www.gov.uk/government/publications/sustainability-and-climate-change-strategy/sustainability-and-climate-change-a-strategy-for-the-education-and-childrens-services-systems> (Accessed 24 April 2024).

04 Working within restrictive systems: seeking routes for action

Climate change is urgent, but the curriculum is lacking:

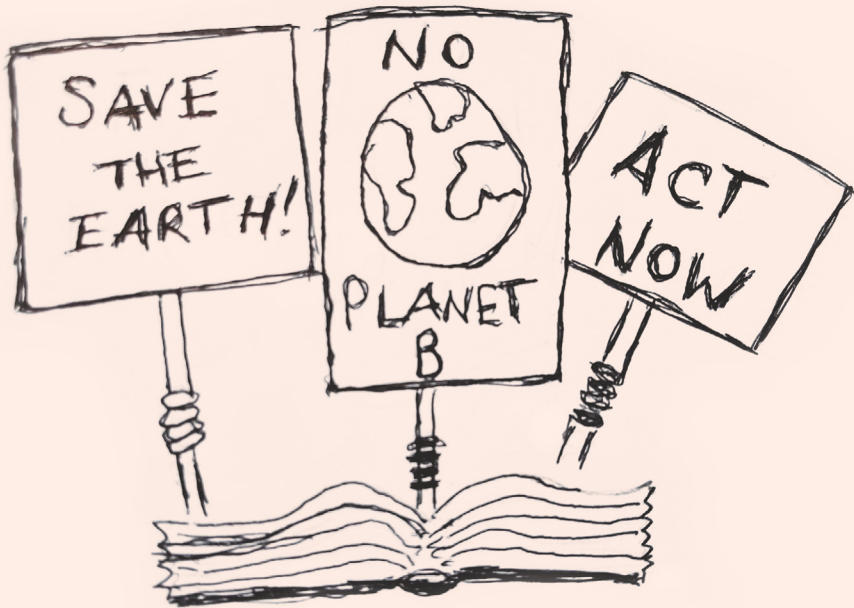
exploring the potential of
a whole-school approach

BY MELANIE ELLIS

Melanie is a science teacher educator in the Cambridgeshire area. She completed the MA in STEM Education at King's College London where she developed an increased interest in environmental – and particularly climate change – education.

Climate change is an ever-present factor in our lives. As the generation who are set to inherit it, young people need climate change education that both develops their knowledge and awareness of the issues, and highlights what actions are needed. Whilst carrying out research within the field of environmental education during my MA in STEM Education, I found myself talking to anyone who would listen about the current lack of consideration given to climate change in our curriculum. People were interested, surprised and shocked by the realities that lie hidden from view for those outside the realm of education.

In particular, my research involved talking with ten secondary school teachers about their experiences, thoughts and opinions relating to climate change education. The aim was to establish whether an approach to this education that centres action would be viable and accepted by teachers as a way forward. The research participants were also asked about their experiences in teaching about climate change, the levels of training and support they had received, whether they felt confident in teaching climate change education, and their knowledge relating to climate (in)justice.



Drawing from this research, this chapter will paint a picture of the current position of climate change education within our secondary schools and consider where changes could be made.

What is the state of play of climate change education in secondary schools?

When asked for their opinions on climate change and the environment in general, the teachers and school leaders I interviewed considered these subjects/areas to be of importance and felt that schools could be doing more to raise awareness of these issues. As my wider reading revealed, this appetite for climate change and environmental education is shared by students. While young people want their immediate environment to be pleasant, taking direct action to care for the natural spaces within schools is more common in the primary sector than in secondary and beyond.

So, what is different in secondary education? The pressures associated with secondary education are clearly recognisable – externally moderated examinations and a

“While the evidence of climate change in the curriculum is fleeting, where it is present, there are reservations about whether it is fit for purpose.”

tightly prescriptive knowledge-based curriculum result in timetables for both students and teachers that are full to bursting. This is before even considering further external pressures in the form of school league tables and the constant dread of Ofsted inspections. The effect of these should not be underestimated, as a school’s grading and relative position in a table can have a devastating impact on staff morale, parental perception, recruitment and retention of teachers and therefore the educational experience and outcomes of students for years to come. In an ideal world, we would brush off these influences and focus on teaching our students what is important, but unfortunately this is not our reality.

In this context, climate change makes a fleeting appearance in the compulsory curriculum, in science lessons. If students choose to study geography beyond the age of fourteen, they will encounter it a bit more. There are opportunities for links to climate change, sustainability and the environment in most subject areas, such as technology, art, music and modern foreign languages, but without being encoded in the compulsory curriculum the choice to address this is really down to individual teachers. This means that individual teachers who are passionate about the environment might well embrace any opportunity to bring it into the context of their subject area. But of course, this is highly variable and young people will inevitably have different experiences on their journey through secondary education.

Does our current climate change education approach work?

While the evidence of climate change in the curriculum is fleeting, where it *is* present, there are reservations about whether it is fit for purpose. Climate change in its current format within the curriculum in England is knowledge-focused rather than action- or solution-focused, as the current government proudly champions its ‘knowledge-rich curriculum’.

“All of the teachers who took part in the study could identify opportunities to link environmental education to the curriculum and to other subject areas, but more time and training was required to make this achievable.”

But maybe this shouldn't be a problem: surely if young people know the facts about climate change as prescribed in the curriculum, then they will make informed choices and this will lead to high levels of pro-environmental behaviours, right? They will choose to do the right thing for the environment because they are aware of the consequences, and they care.

Unfortunately, the evidence does not support this view. Research has revealed a ‘knowledge-action gap’ in this area. The PISA 2018² survey of fifteen-year-olds from 79 different countries reveals some surprising and eye-opening trends. Firstly, analysis of climate change awareness and pro-environmental behaviours reveals there is no correlation between the two. Let that sink in for a moment. Even if young people are aware of climate change and its effects, they are no more likely to choose environmentally friendly options, which provides evidence to support the ‘knowledge-action gap’. Secondly, young people from higher socioeconomic backgrounds (when analysed by country) are less likely to demonstrate pro-environmental behaviours. Of the countries surveyed, the UK had the lowest score for pro-environmental behaviours, trailing Germany, Ireland, Italy, Switzerland and France.

What is the alternative and is there an appetite for this approach?

The answer to the lack of climate action may be a more action-oriented approach to climate change education, which transcends traditional subject boundaries. My research involved interviewing ten teachers within a ‘typical’ state secondary school, who taught across a range of subjects with varying levels of experience, but had all previously taught in other schools. All of the teachers who took part in the study were in favour of a school-wide action-oriented approach to climate change education, but were looking for support to develop more imaginative

and creative ideas. They could identify opportunities to link environmental education to the curriculum and to other subject areas, but more time and training was required to make this achievable.

Almost all the teachers I spoke to had received no training in this area to date. Some were concerned about the need to tread a careful line when discussing issues relating to taking action, as teachers are required by the Department for Education to present an apolitical stance within their role. They were wary of being seen to support climate change protestors, as there have been some recent high-profile cases resulting in jail sentences for activists. It was also identified that support is needed to enable teachers to conceptualise climate change education as a socio-scientific issue focused on climate justice and action. In short, they need ideas and support to enable them to feel confident in discussing examples of climate (in)justice and suggesting actions young people can take, without verging on partisan politics and controversy which may place them in an uncomfortable situation.

It was also surprising and revealing to find that all of the school leaders interviewed were positive about the prospect of introducing a whole-school action-oriented approach to climate change education. One in particular thought it should feature across all subjects and be a part of everything, including whole-school values, and that this should be communicated to parents and students. There are different levels to which a 'whole-school approach' could be developed within a school; from projects spanning across different curriculum subjects, to teachers developing an awareness of how and where climate change features in different subject areas, and the development and emphasis of links to climate change and sustainability within subjects. A school may choose to elevate caring for the environment into their core values and vision for the school, then develop ideas which are embedded in

the curriculum from this starting point. One view which came across strongly from all the teachers who took part in the study was that this should involve all stakeholders and not be led by a small group of interested teachers, as is currently often the case.

The teachers who took part in the study were full of ideas that could be developed into cross-curricular projects and were keen to be given the opportunity to work with other teachers to take these ideas further and make them a reality. In the meantime, there are pockets of great teaching linking the curriculum and our real-world experiences to the environment, but as previously identified, this is highly variable. The biggest challenge facing school leaders who wish to instigate any change is the time required to do so; to investigate, discuss, plan, train and implement. With so many important factors vying to be prioritised, sadly the issue of environmental education, whilst important, is simply seen as not being important *enough*.

Where does this leave us?

This research took place in a single secondary school in England, but the findings are still both revealing and encouraging. In this school, there is an enthusiasm and a willingness to adopt a whole-school approach to climate change and the environment and to embed this as part of the school's values. I am willing to predict that this same sentiment would be found in many other schools across the country. The building blocks are here, and this is very encouraging; there are glimmers of hope on the horizon.

So, what is stopping schools from taking the next step and putting this into practice? I refer back to the pressures on schools, particularly external. It is anticipated that there will be a national curriculum review within the next few years, and a change in administration looks likely before the end of 2024. Should schools wait for this? What happens in the meantime? More cohorts of young people who are products of a curriculum that is not fit for purpose? Perhaps schools could consider how they present climate change, the environment and pro-environmental behaviours as part of their whole-school vision and values. The majority of schools now have significant autonomy in establishing their overall values and identity, therefore all schools could prioritise sustainability – bringing it alive in the curriculum, across the campus and through the school culture.

In summary, my findings can be taken on one hand to paint a bleak picture, like climate change itself. However, there is also a picture of hope, as the willingness and enthusiasm for action as far as individual teachers are concerned is there, lying just below the surface. Something

“The majority of schools now have significant autonomy in establishing their overall values and identity, therefore all schools could prioritise sustainability – bringing it alive in the curriculum, across the campus and through the school culture.”

is needed, however, to take this to the next level, to break the bubble and release this potential. My research does not necessarily provide the specific answers or suggest an ideal model for climate change education, but it does show that amending and updating our current curriculum, and ensuring a whole-school approach, should be a top priority for policymakers. H

¹ Knutti, R. (2019). Closing the Knowledge-Action Gap in Climate Change. *One Earth*, 1(1), 21–23. <https://doi.org/10.1016/j.oneear.2019.09.001>

² Organisation for Economic Co-operation and Development (OECD). (2018). PISA 2018 Database. Available at: <https://www.oecd.org/pisa/data/2018database/> [Accessed 11 May 2024].

05 Working within restrictive systems: seeking routes for action

What is the role of civil engineering when the world is on fire?

CAROLINE CHISHOLM

Caroline is an education manager in Kent, having previously taught secondary science for over a decade. She completed her MA in STEM Education at King's, where an interest in environmental education developed.

In Amitav Ghosh's book *The Nutmeg's Curse*¹, terraforming is where immense stretches of terrain are remade to suit the settler, the coloniser or the incomer. Often used in the context of extra-terrestrial planetary exploration, Ghosh argues the description is appropriate to the colonialism of the Empire and the conquest of lands in North America. That is, where settlers arriving in the New World not only renamed features of the land, from rivers to villages, after English versions, with the prefix 'new', they simultaneously modified the land to reflect its European namesake. Terraforming fails to see the relationships, work and lives of the native and indigenous people who are living in harmony with ecosystems. The act is both anthropocentric and Western-centric. Settlers disregarded the active work of the native peoples and perceived them to be lazy and merely collecting from the land. They did not see how these people actively supported the ecology to produce the bounty they so coveted and, in their haste to extract, without understanding, they would cause untold damage.

Terraforming is not only in our distant past; it has been continually taking place, having a significant role in the environmental and climate breakdowns experienced today. At the helm of many of these transformative landscape



projects is civil engineering, the construction of everything ‘man-made’ around us. In the past, civil engineering has been defined as requiring dominance over the land and aspects of nature, with a duty to ‘tame’ the lands for human purpose. It concerns changing the face of the Earth to suit the needs of our species, with little consideration for nature as anything other than a resource to be utilised as needed. However, modern engineers perceive civil engineering to be working in harmony with the natural world, creating so many things that humans, certainly those living in Western cultures, would consider part and parcel of our daily lives, and without which we would struggle. Civil engineering gives us electricity, clean water, disposes of our waste, creates our highways and much more. It has changed the face of the land around us, and continues to do so, but is now listening more closely to calls for environmental action, working increasingly in tune with nature with a regard for future generations.

Where work meets studies

As Education Manager for the Rochester Bridge Trust, a charitable organisation responsible for maintaining

infrastructure and promoting the work and careers of civil engineers, I enjoy helping young people explore the possibilities that such a career may offer. As a charitable organisation, a key aspect of our work is ensuring it is in the public interest: activities must be beneficial, and any harm or detriment must be outweighed by the primary purpose. In recent years, the Trust has become a leader in foregrounding environmental concerns when planning, designing and completing projects. For example, it completed a net zero carbon project by offsetting the carbon emissions through construction of a native woodland on unused farmland. We now use electric vehicles instead of diesel and track carbon values for every purchase in our administrative functions. These acts are all commendable and necessary and, given the charitable nature of the organisation, align with ensuring the public benefit by acting in a global context. Until recently, I would have considered this enough in terms of 'greening' our sector. However, in studying for my Master's, through the *Environment, Sustainability and the Role of Education* module I started to consider, for the first time, how our perspectives on nature and the environment, both global and local, can influence our behaviours towards the climate crisis and inform our position on environmental justice. My studies encouraged me to consider other perspectives on environmental education and related issues – to appreciate that it isn't just a way of teaching certain scientific or geographic facts to complete qualifications. Rather, I began to see environmental education as a way to appreciate and engage with the world around us. Amitav Ghosh's ideas, amongst others, opened the door to a range of viewpoints quite distinct from my own.

What more might civil engineering do?

With my Master's readings in mind, back in my day job, I have been increasingly aware of the significant role that civil engineering has in our collective response to climate change adaptation and mitigation. However, beyond technological fixes, I have been concerned by the role we have in socio-scientific solutions. For example, due

Some of the greatest challenges in human existence have led to some of the greatest civil engineering achievements.

to climate change, marginalised peoples are less likely to have access to the things they need to live (including, clean air, water and fresh food)²; civil engineers can grasp this challenge and work with communities to help design better environments to improve people's quality of life alongside the environment they live in. That is, given climate change is largely caused by industrialised nations, and the impact is often most keenly felt by those in the Global South or poorer nations, civil engineers may have a key role in centring issues of environmental justice.

Some of the greatest challenges in human existence have led to some of the greatest civil engineering achievements. Engineers have developed solutions to challenges faced by populations, be it dealing with waste, or surviving floods or earthquakes. In the near future, the human population will have more challenges to face, as weather systems are disrupted through climate change: this is inevitable. Civil engineers are well-placed to face these challenges and support work to develop climate resilience. The butterfly effect suggests that the smallest change can deeply influence a much larger, interconnected, complex system, illustrated by the idea that the flapping of an insect's wings can cause a typhoon on the other side of the world. With this in mind, how might human activities impact communities, local and global environments? Perhaps our actions are not as unpredictable as this theory suggests, but this example highlights that any civil engineering 'solution' does not exist in isolation from the wider world. Organisations often cite that they are striving for 'sustainability' in this industry without really reflecting upon what sustainable development means in practice. A developed environmental education can offer the opportunity for such reflection, to examine how actions taken now will impact future generations, and consider the needs of the global population, not just those in the Global North, or richer nations.

A further example, particularly close to my heart as an education manager, is the importance of young

people and their increased interest in sustainability and climate action, both now and in their future careers. Young people who believe engineers are important in improving the environment are far more likely to want a career in engineering, particularly if they see environmental sustainability as a key factor in the future. Collectively, the sector can offer opportunities for young people to take action, both for their own personal ambitions and interests and for the greater environmental good.


Where to next?

The image of engineering is changing. It is having to change, both in the face of the climate crisis and as young people's demands about the lives they want to lead evolve. These responses require young people to develop their problem-solving skills and have opportunities to unleash their creativity. Schooling currently doesn't prioritise these qualities, without which engineering will not progress. However, other sources of inspiration outside formal education can be found, such as Rob Hopkins' book *From What Is to What If: Unleashing the Power of Imagination to Create the Future We Want*³, where the reader is supported to imagine a future where local communities are encouraged, and projects are initiated through collaborative efforts. He begins the book through a story – a method that resonates deeply within human beings, as stories are part of our cultural heritage – and as he suggests, these (hopeful) stories are something we greatly need. In his story, he imagines that things turn out okay and invites the reader to envisage how we might achieve this imagined changed world.

A question posed by Hopkins is “what if we followed nature's lead?”, and he focuses on the loss of biodiversity, a lack of connection with nature or experiences of wildlife, and the loss of language associated with it. Nature connection often wrongly is considered something that can happen in the wilderness only – outside our cities. However, this is not the case, and as Angelina Samanya

noted in *Heartwood* Volume 1⁴, her experience of growing up in London was daily connection with nature due to the abundance of parks in her neighbourhood. All these green spaces had been planned for. So, whilst it can sometimes feel as if civil engineering can be cruel in robbing people of access to nature, when creating structures that may even be awe-inspiring or beautiful themselves, there are some examples of when people and planet are considered in tandem. Indeed, examples such as Victorian designed parks and London Plane tree-lined streets illustrate the positive impact good planning and design can have centuries on.

Given what we know, in the face of the climate crisis, perhaps the only limitation for engineering is a lack of imagination and the ability to rethink and repurpose their profession – to find inspiration in those Victorians who did align design with, rather than above, nature. There are signs of hope: some civil engineers are beginning to design infrastructure around a concept of ‘staying local’, being about to access all services within fifteen minutes of your home, which offers a potential response to the climate crisis. How wonderful to have access to most, if not all, of what you need in such close proximity! The Covid-19 pandemic gave people an opportunity to reflect and consider different ways of living and working: working remotely offers potential for reduction of our individual impacts on the planet through a decrease in commuting. And whilst this may require significant shifts from people and organisations alike, in both mindset and logistical aspects, civil engineers have a role in developing infrastructure that can support a ‘new normal’.

Civil engineering provides wonderful opportunities to develop new ways of working. “Directing the great sources of power in nature”⁵ could be an exciting challenge for young people to grasp, through harnessing the power of imagination. When reflecting upon the work of the early engineers, we cannot deny that it took immense ingenuity and imagination to achieve the engineering they did. Modern engineers must channel that mindset, working to re-terraform, to build in new ways that enhance or celebrate nature and help achieve necessary change. Various organisations and bodies within the industry are advocating for engineering to tackle the challenges of the climate crisis and strive for change, making it clear that sustainability and inclusion are at the heart of such actions. This is something that can resonate with young people and a perspective that has the climate crisis irrevocably intertwined. At a time when the future can look dark, this may offer hope. 

“What if we followed nature’s lead?”

- ¹ Ghosh, A. (2022) *The Nutmeg's Curse – Parables for a Planet in Crisis*. John Murray Press, London, UK.
- ² Scott, W. & Vare, P. (2018) *The World We'll Leave Behind – Grasping the Sustainability Challenge*. Routledge, London UK.
- ³ Hopkins, R. (2019) *From What Is to What If – Unleashing the Power of Imagination to create the Future We Want*. Chelsea Green Publishing, London, UK.
- ⁴ Glackin, M., Hine, S., & Perry, S. (Eds.) (2023). *Heartwood: Voices from environmental education: Academic research meets head, heart and hands*. King's College London.
- ⁵ The Institution of Civil Engineers (2018) *Royal Charter and By-laws*. Available at: <https://www.ice.org.uk/download-centre/royal-charter-and-by-laws> [Accessed 17 May 2024].

Rooted in emotion:

plant awareness from children's perspectives

BY RACHEL SAWLE

Rachel is a primary school teacher in London. She recently completed her MA in STEM Education at King's College London and plans to continue her research into plant awareness by undertaking a PhD.

Plants support every living system on Earth, are integral to the water, energy, oxygen and carbon cycles and constitute 82.4 per cent of the planet's biomass. Life on Earth would not exist as it does today without plants. They keep us alive with food and medicines. They decorate our houses, streets and gardens. But is there more to plants than we have come to value them for? Do we see plants as equal or lesser beings – if we see them as beings at all? Or are they simply inanimate entities which provide for humans?

In the late 1990s, two educators in the US – James Wandersee and Elizabeth Schussler – coined the term *plant blindness* to describe their students' disinterest in learning about plants¹. They described four aspects of plant blindness: not noticing plants, not appreciating their importance for the planet, seeing plants as inferior to humans and other animals, and not appreciating plants' unique features. In the UK, we do notice plants: we have hours of weekend television dedicated to gardening programmes, parks and gardens, our streets are lined with trees and we gift each other houseplants and flowers. When you drill down, it's commonly understood how important plants are for keeping us all alive – we are, after all, taught this at school. But do people consider plants as equals to animals, as having meaning beyond their utilitarian value? How do humans really feel about plants? Before I started



my Master's research, I hadn't given these questions much thought.

As I began to consider human-plant relations in more detail, I found there was little research into children's attitudes towards plants beyond their cognitive understanding, or which explored possible barriers to plant awareness. My own experience as a primary school teacher prompted me to consider these questions further. Like all educators, it is important to me to understand how children learn best. If a subject holds importance, learners will be motivated; without motivation, teaching and learning can be a futile process. How, then, do we engage children in plant learning? Much educational research focuses on the cognitive aspects of learning – *knowing* – but not so much on the affective aspects – *feeling*. And this is no different for plants. Learning about animals is easy as children love them: they see them in books, films, cartoons and documentaries; they have pets and teddy bears; they visit farms and aquariums. Vertebrates, especially, have a

“Rather than thinking in more ‘primitive’ ways that are seen as lesser, children arguably see things with greater clarity and freedom because they haven’t yet been as conditioned as adults to rank and categorise others.”

face similar to ours; it is therefore easy to imagine them as characters in a story and to have affection towards them. This contributes to our ranking of animals above plants – a phenomenon known as *zoochauvinism*².

In my recent Master’s project, I therefore decided to explore children’s affective attitudes towards plants: not just whether they were interested in learning about plant science or if they knew the names of plants, but if – and how – they were connected emotionally to plants, and how they felt about plants beyond their appearance or use.

The national curriculum in England³ requires children to understand and explain food webs. However, these concepts are often taught with plants at the ‘bottom’ of these webs and chains, represented by a nondescript green grass-like mass or just a simple label of “plants”. According to the curriculum, plants exist to serve other living things as food or shelter. This absence of plant awareness in the national curriculum, coupled with existing literature which finds children in urban settings to have low plant awareness (due, in part, to reduced contact with plants⁴), led me to expect the participating children to reflect this tendency. However, when I listened to the children during my research project, I was captivated and moved by their discussions as they opened my mind and heart to their relationships with plants, which went well beyond shallow utilitarian appreciation.

The following excerpts are composite examples of responses from various pupils participating in the study. The data was collected from small groups of nine-to-ten-year-old children at the school where I was working as a teacher. To stimulate the discussion, we used photos and a concept cartoon – a teaching resource that depicts a scientific concept with a group of children discussing what is happening and expressing contradicting views. This way, the children can discuss and unpick viewpoints they may have considered themselves without the worry of ‘getting it wrong’. To get the children ‘warmed up’ and talking, we looked at photos of green areas – some of familiar

“The long-term health of the planet depends on plants and our understanding and kinship with them is pivotal to achieving a sustainable future.”

places like the gardens of local houses they might pass on the way to school, the local park, our school wildlife area and other generic examples such as a home with lots of plants, an allotment or a woodland. As we looked at these photos, many children began to tell me how they felt safe and happy in these places, away from the chaos of urban life (unsurprising considering the school setting is an urban area). The following responses communicate the children’s appreciation of plants’ role in the biosphere, but also relationships which illustrate feelings of equality, empathy and community.

One boy, Vader, explained:

“The plants make you happy. So that it connects to you. I don’t know how, but it makes you happy. It makes you joyful from the inside. I know they provide us with food and clean air but there’s more to it, they make a joyfulness. I’m grateful for all they provide but it means more than this.”

Sid continued:

“Plants have values, like we do. They have feelings, like we do. So it connects us, it makes us the same but different.”

Dhania attempted to explain further:

“I also feel connection with plants, because it sounds weird, but when I water my plants, I talk to them. It’s kind of just like the same as talking to humans because it kind of makes you feel like it can hear me. It makes me feel like I can just tell it secrets because it won’t tell anyone.”

Another girl, Trisha, felt similarly:

“I can express myself around plants. If I have a lot of plants in my house, I can feel the energy.”

After we looked at the photos, we moved on to discuss the concept cartoon of four children talking about how they value plants and whether or not they saw plants as equals to animals. One girl, Helen explained:

“Plants are just valuable because they help us see the world by a different view. And they’re also important because they provide us with food, clean air and other

resources. But I think that, like, they are just important, and we could use them. But like, we shouldn't chop them down for resources. But for the clean air, I think that it's true, because that's what they are supposed to do. And for food, I think we should only take the food if it's fallen to the ground or something."

I asked Helen what her reasons for saying this were and she continued:

"Because if we pick it them, they can't grow more. If they fall, it's a chance that they could be producing to give us more, maybe."

Helen then indicated to a girl in the cartoon saying that plants are important only because they provide us with resources, and told me:

"I think all living things are equally important. But if you look at it in the way of how we use other things, I think that maybe we think we're above. I think we might be a bit below as we use the other living things for us to survive. As the other living things, they work with what they have and survive by themselves. While we use animals for meat and plants for food. And to do this we use our fungi so that our food doesn't go bad. And we use the trees for electricity I think... no, carbon, carbon fossils for electricity. That might be a bit below because we use the others."

As we continued to talk about how we saw plants in relation to animals, the conversation turned to equality among plants. Sid, normally a shy child who avoids speaking unless absolutely necessary, talked extremely passionately about this subject:

"I was thinking about weeds because most people, they leave other plants but weeds are ugly so they pull them up. They think weeds are like a lower level to other plants. But they look nice, they're just plants like the others. I've seen those ones with the pointy leaves, if you leave them they are beautiful."

As these examples demonstrate, the pupils considered themselves and plants as equals. They spoke about plants being able to sense our presence, having emotions, feelings and values. This depth of recognition reminded me of the work of the ecofeminist writer Rosemary Radford Ruether, who described the body/soul dualism: the body is from the earth, primitive and primeval, but the soul is superior


and does not perish and wither like the body. Depending on which beings we believe have souls, we position them differently in our constructed hierarchy. So whether a plant is deemed alive or not, if they are perceived not to have souls, it becomes excusable to oppress and exploit them to meet our own ends, irrespective of the consequences.

On the other side of the coin is how children engage with living and non-living others. Jane Mereweather, an early childhood researcher, coined the term *enchanted animism*⁵ to describe how children see energy and life in objects and beings around them – not just vertebrates but insects, worms, plants – even clouds or rocks. Their profound connection with the world goes beyond naming and explaining and towards an immersion in the world around them and interconnection with non-humans. The way in which Vader, Dhania, Sid, Trisha and Helen spoke of plants reminded me of when I was a child sitting in our back yard in Plymouth, spending hours and hours playing and chattering with the woodlice that lived in the flowerbed. I called them *tookies*. According to my parents, each one had a name, a life, a story.

It became clear from listening to the pupils that they hadn't yet learned to create hierarchies and hence were able to feel the connection between themselves and plants. Instead of dismissing this perspective as childish or naïve, there is wisdom to be gained from it. Rather than thinking in more 'primitive' ways that are seen as lesser, children arguably see things with greater clarity and freedom because they haven't yet been as conditioned as adults to rank and categorise others.

Giving the children space to discuss their feelings around plants allowed me a small and enlightening glimpse into the world as they see it. For this to happen, it was essential that the children were positioned as the co-creators of knowledge. Listening to them brought home how, as educators, due to pressures from the curriculum, progression and attainment targets and the deep-seated drivers of mainstream education, we often fail to give time and space to really listen to children's feelings, beliefs and knowledge. Instead, we listen to what we want or expect to hear and dismiss perspectives that disrupt our established hierarchical ways of thinking.

While I am still constrained by the demands of mainstream education, my own practice has shifted towards raising plant awareness in small achievable ways. For example, affording children space to share their plant experiences, mindfully engaging with plants in the classroom and outdoors, watching them grow and change over time, and thinking about them imaginatively as well

as scientifically. All of these have raised the profile of plants in my classroom. I find that when teaching science, highlighting plants' immense role not only in the transfer of energy in a food web but also in the capture of carbon or production of oxygen, stimulates awe and respect for plant life. The long-term health of the planet depends on plants and our understanding of – and kinship with – them is pivotal to achieving a sustainable future. The examples presented in this chapter illustrate what Jane Merewether says about the intentions and emotions children ascribe to non-human others, *enchanted animism*. This is something we need to nurture in order to develop a lasting sense of care for the planet. 

- ¹ Wandersee, J. H., & Schussler, E. E. (1999). Preventing Plant Blindness. *The American biology teacher*, 61(2), 82-86. <https://doi.org/10.2307/4450624>
- ² Hershey, D. R. (1996). A Historical Perspective on Problems in Botany Teaching. *The American biology teacher*, 58(6), 340-347. <https://doi.org/10.2307/4450174>
- ³ Department for Education. (2013). National curriculum in England: primary curriculum. Department for Education. Available at: <https://www.gov.uk/government/publications/national-curriculum-in-england-primary-curriculum> [Accessed 1 May 2024]
- ⁴ Stagg, B. C., & Dillon, J. (2022). Plant awareness is linked to plant relevance: A review of educational and ethnohistorical literature (1998–2020). *PLANTS, PEOPLE, PLANET*, 4(6), 579-592. <https://doi.org/10.1002/ppp3.10323>
- ⁵ Merewether, J. (2019). Listening with young children: enchanted animism of trees, rocks, clouds (and other things). *Pedagogy, Culture & Society*, 27(2), 233-250. <https://doi.org/10.1080/14681366.2018.1460617>

07 Working beyond restrictive systems: alternative practices and values

The good life: altruism, ego and value change

BY NADIA MITCHEN

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I have always been passionate about the environment and understood that we need to act for it if we are to conserve it. Whilst at school, I took part in Model United Nations conferences, acting as the environmental representative and calling for investment in renewables and decreased reliance on fossil fuels. My concern for the environment continued into university, where I studied environmental science. I always believed that the younger generation would be able to make the necessary changes to limit global warming – we just needed to spread the word. Teaching science was therefore a natural step in sharing my love of nature and helping to educate people about the importance of conserving the environment. As my first year as a teacher coincided with the first United Nations Climate Change conference (COP 1), I was hopeful that the politicians I emulated as a student were finally coming together to make the necessary policy changes to limit rising global temperatures.

Unfortunately, this was not to be: the effects of climate change are rapidly becoming more evident and widespread. To many, like my students living in a temperate climate, these changes are things learnt about



at school, read about in books or viewed on TV, but never fully experienced. Reflecting on my own environmental awareness at school age marked a contrast to my students' current disconnection from the issue. As a result, I sought to better support students to learn about the environment and the effects of climate change so that they would value nature and go on to care for the natural environment as adults. In this way, I hoped they could foster a greater connection between themselves and the people, other species and environment affected by anthropogenic climate change. I explored this further through my Master's research on value change and behaviour. In this chapter, I will share findings from this study and outline what I believe are important steps to consider when educating about climate change.

Value hierarchy

I recently moved to a leafier area of London to teach in a private prep school. In contrast to the students I had previously taught, whose disengagement with nature I put down to living in urban areas with little access to green spaces, I expected these students to have a greater appreciation of nature as, living in this more affluent area,

“With no mention of how to implement climate change education in teacher training, we rely on teachers who, like me, have the passion to educate the current generation to value nature.”

they were immersed in it. I was quite taken aback, however, when in marking a question on whether money should be spent on conserving a particular moth species, none of their responses were about the innate value of the moth or its environment. Most answers concerned its value in relation to themselves and how it would be a waste of money as the moths were of no use. Some did, however, refer to money being better spent looking after the poor and hungry.

These egoistic and altruistic values ranked the moths lower than humans. This in itself was not unexpected; what surprised me was the lack of empathy for the plight of this endangered species. Although humans had caused the moth’s decline, none of the students felt it was our duty to right this wrong. This concerned me: if they didn’t value nature – or the parts they could see no use for – would they advocate for nature as the environmental crisis worsens?

The actions we take to look after our environment are based on the values we hold. Scholars such as Schultz’ have found a link between values and behaviours. Indeed, our hierarchies of values act as critical motivators for our actions. Hence for one to act pro-environmentally, one must value the environment highly enough to perform such actions. The overarching aim for my research was to increase my students’ connection to nature. To do this, I explored students’ ranked values concerned with the environment and developed pedagogical approaches to encourage value change. This I termed ‘value change pedagogy’.

In considering whether a particular method of teaching would influence students’ values, I looked at different types of pedagogy to teach *about* the environment, *for* the environment and *in* the environment. I wanted to understand which method might alter their values towards that of caring for the environment and move them towards taking action. I planned two teaching interventions, which were not innovative or novel but went beyond the bounds of the curriculum. Alongside ‘standard’ classroom ecology lessons, the two interventions were: researching and presenting aspects of sustainability, conservation or climate change and summarising this in a letter to their MP (a form of activism); and placed-based learning through going out into three different areas of nature (woodland, playing fields and hedges) to investigate biodiversity and discuss it in relation to land use (sampling). After each intervention, the students completed a questionnaire and a card sort, in which they were asked to order a series of cards according to the question:

“I am concerned about environmental problems

because of the consequences for: ...”

These cards were chosen to illustrate their biocentric (plants, animals, marine life), altruistic (future generations, children, all people) or egoistic (my life, my future, my country) values. The order they placed on the cards was then used as a stimulus for a discussion about their views on the environment. I found that, after each intervention, there was one overarching theme that was discussed: that of wanting a “good life”.

Egoistic beginnings

So what does it mean to have a ‘good life’? In the 1975 TV comedy of the same name, one set of suburban neighbours, in trying to get out of the ‘rat-race’ of life, tried to become self-sufficient, growing their own food and reducing their output. By wanting less and not striving for more material items, they chose to get closer to nature and make what they could with what they had. For their neighbours, the ‘good life’ was full of consumerism, clothes and technology.

By contrast, my students’ desire for a good life was, initially, mainly egoistic and consumerist. For some, it meant money, cars and commodities; for others it was a life similar to what they were currently experiencing: holidays, a nice house and not worrying about finances. Wanting a good life is natural, but what that life entails is subjective and is linked to one’s values and beliefs. As the comment below shows, for some students, thoughts of the natural world had little to do with what a ‘good life’ meant:

“My lifestyle and my future are important to me as I want to live a good one [life] When I’m in nature, I notice it but I don’t pay much attention, it’s just there” – Eric, 13

This was echoed by another student, Cedric, who, at the beginning of the study, failed to see how climate change would affect him achieving a good life, believing it to have no effect on his lifestyle. I found this somewhat surprising, for whatever one’s vision or version of a good life, it has always been important to me that we take the environment into consideration, as without taking care of the world we live in, what kind of a ‘good life’ can the future hold?

Towards the end of the study, however, Cedric alerted the group to an increased need for change. He called for governments to make changes to policy, as:

“My future is important to me and it can be affected by climate change. If the world takes an epic hit and people can’t do certain things, it’s going to affect my lifestyle and future generations as well because they wouldn’t have life as we do now.” – Cedric, 13

His take on climate change and its effect on how good a life he will have, although egoistic, still moved the

“Harnessing the notion of a ‘good life’ – and what that might look like – can help motivate students to expand how they think about the effects of climate change and consider their own values in relation to this.”

environment higher up in his thinking. Thus, by showing him the link between nature and the future he holds dear, he was able to see the need for change and reported subsequent increases in his pro-environmental behaviours such as no longer buying bottled water and eating less meat.

Other students who started off as biocentric – showing more empathy towards nature – also moved further towards altruism as they realised the impact climate change was having on other people’s ability to have a good life. They, like me at their age, believed that the main reason more wasn’t being done to alleviate the causes of climate change was that people didn’t know how it affected them and that if they knew more, then they too would change their behaviours. As a whole, the group became more altruistic in their card choices and, as such, reported more pro-environmental behaviours, as they wanted future generations and children to have a good life. As Walter said:

“Everyone needs to have a good life and we shouldn’t harm that”.

These altruistic concerns for the environment with humans at the centre illustrate their desire for all people to have a good life unhindered by the effects of climate change. This move away from egoistic beginnings and closer to altruism was one of the main findings in my research. In the following section, I’ll outline the effects the study’s interventions had on achieving this.

Moving towards altruism

The intervention I had the most hope for shifting students’ views was that of getting out into nature: teaching about nature, *in* nature and allowing pupils to see for themselves the impact of land use on plant biodiversity. I hoped that this place-based learning would ground their understanding of the importance of a varied plant life and its impact on the animals reliant on it. However, this was not the case: instead, they commented that, as plants appeared plentiful, they “[didn’t] see them as running out anytime” and that even though they are “key for the environment, they are not the main concern”. In perceiving plants as abundant within the outdoor settings we visited, the students failed to realise the impact of biodiversity loss on the future lifestyles they so wished to protect. I therefore found this sampling intervention an unreliable pathway towards shifting their values.

Through the speech-writing activity, many saw that, in addition to educating the masses to act, big businesses should also take some of the responsibility to help make the necessary changes to alleviate the harms caused by humans. Some called for large companies to stop

producing plastic and use alternatives. Others asked that those governments with large swathes of forest should impose bans on deforestation and, in response to the loss of income, improve their ecotourism. This desire to create change in response to the anthropogenic causes of environmental damage was mainly to improve the lot for humans, both present and future. This activity had the greatest impact in moving the students' values away from egoism towards altruism. Along with the speeches, the subsequent letter-writing activity made them feel more empowered, alleviating the helplessness they felt at the beginning of the study.

In carrying out this research, I realised that basing environmental education on altruistic concerns – that of the consequences to people and the effect changes may have on their experiencing a 'good life' – showed the greatest change in their values. Showing students that they have the choice to act according to their values and beliefs (for example, when choosing how to spend their money) helped to anchor their concerns for nature to a cause and offered them a way to achieve their 'good life'. The study's biggest impact was to move those with mainly egoistic views towards altruism. As one of them rightly said:

"We've had a good life... We created the problem, we should deal with it, not [future generations]... We shouldn't burden them, we should fix what we created." – Walter, 13

The good life: centred around nature

With no mention of how to implement climate change education in teacher training, we rely on teachers who, like me, have the passion to educate the current generation to value nature. However, without adequate guidance it is difficult to see how we might achieve this, especially when, for many students, the effects of climate change aren't obvious in their daily lives, making it difficult for them to see the effects of consumerist culture on the world around them. This is reinforced by Government policy, which mandates that education prepares students with the skills to succeed in a demanding economy, thus placing a higher value on material wealth than on care for our planet. I believe that, instead, we must prepare students for a regenerative economy, as continual economic growth is unsustainable. Education should foster critical thinking to enable them to think of a way out of the present crisis and towards a life they have reason to value, where they see the value in nature and how it links to people.

But how do we do this? Spreading the word and scaring people with data and projections to make the necessary changes hasn't worked. Harnessing the notion of a 'good

life’ – and what that might look like – can help motivate students to expand how they think about the effects of climate change and consider their own values in relation to this. Encouraging students to look outwards from an egoistic starting point, rather than shaming them for wanting the kind of materialistic ‘good life’ they’ve been taught to strive for, can encourage them to think more critically about the values they are prioritising with the choices they make. To do this, teachers need guidance on the approaches and pedagogies that can support this. As my study showed, activities which allow students to play an active role, such as the speech- and letter-writing interventions, may support greater altruism towards others and the natural world, not only by empowering them to take action, but by prompting them to view their own values and the decisions that arise from these within a wider context.

As for what the research says, a book based on the longest ever study on happiness – entitled *The Good Life*² – shows that the happiest people are part of a community with close ties to family and friends. For me, these ties must include our relationship with nature, and modelling behaviours and values that place nature higher in our beliefs is something I will continue to strive for in my teaching, to show my students that seeking wealth and commodities ultimately do not make for a happy life. It seems Tom and Barbara were onto something in wanting to leave the rat-race in that TV show 50 years ago. H

¹ Schultz, P. W. & Zelezny, L. C. (1999). Values as predictors of environmental attitudes: Evidence for consistency across cultures. *Journal of Environmental Psychology*, 19, 255-265. <https://doi.org/10.1006/jjevp.1999.0129>

² Waldinger, R., & Schulz, M. (2023). *The good life: lessons from the world’s longest scientific study of happiness*. Simon and Schuster.

Stopping to smell the wild garlic:

the significance of neurodiversity
for environmental education

BY SHIRIN HINE

Shirin is a PhD student at King's College London.
Her research looks at Forest School and its potential
contribution to environmental education.

“Not seeing the forest for the trees” is a phrase I’ve encountered repeatedly while researching Forest School. It’s an obvious metaphor in this context, but it evokes a tension I’ve often thought about over the course of my studies: the need to be attuned to the detail of the research – the minutiae of learners’ interactions within a particular setting – without losing sight of the bigger questions I’m seeking to explore. One of these questions concerns the purpose of environmental education in a world irrefutably in crisis. It is increasingly recognised that the climate emergency has been accelerated by the dominance of oppressive, extractive attitudes and behaviours, normalised and privileged within our current systems and institutions – including within education. If environmental education is to fulfil its role in helping us address the current crisis, it is therefore clear that a business-as-usual approach, in which traditionally powerful voices continue to dominate, is inadequate. More than ever, we require diverse ways of thinking beyond these norms. Environmental education, then, must give voice to those who might help us experience and engage with our environment in different ways, but whose contributions



are often overlooked within mainstream, one-size-fits-all models of education.

Stepping back outside the forest to reflect on how this might be achieved has often felt daunting. Though Forest School, as an ‘alternative’ outdoor educational approach, is conducive to doing things differently, its (increasingly common) inclusion in mainstream schools can be tokenistic, diluting its pedagogy and making it difficult to gauge its potential. In this chapter, I’ll discuss how a particular aspect of my research – namely, observing neurodivergent learners in Forest School – together with my own personal experience, has unexpectedly helped me begin to address wider questions about the purpose of environmental education and how it might be enriched, not only by alternative pedagogies, but by ways of learning often hidden from view.

Considering neurodiversity in environmental education

Neurodiversity – the idea that humans experience, interpret and interact with the world around them in different ways – is an increasingly familiar concept to educators. Within this paradigm, *neurodivergent* people – those whose brains process information in a way that differs from the

“Forest School seemed to allow learners the space to relate to the species around them in ways that were not narrow or predetermined but sensory, cognitive, emotional and vastly varied.”

neurotypical majority – comprise an estimated 15 to 20 per cent of the population, a statistic reflected in the percentage of school pupils identified as having Special Educational Needs (SEN)¹. The term *neurodiversity* itself, coined in the 1990s by sociologist Judy Singer, is not unproblematic: critics argue that it is reductive, dichotomizing and may minimize disability. Nevertheless, it is a framework which includes us all, arguably destigmatizing difference and acknowledging the immeasurable variety in how human brains process and respond to information.

The link between neurodiversity and environmental education isn't necessarily obvious. Where discussions of these areas converge, they are generally unidirectional, focussing on how neurodivergent learners – often only deemed able to participate in limited ways – might be helped to access predetermined educational approaches, rather than on the potential contributions of such learners. In the case of Forest School, such discussions largely centre around the therapeutic benefits to children who struggle with mainstream education which, while important, is not the focus of my current research. As I began my study, the significance of neurodiversity therefore wasn't something I'd considered in much detail.

In a personal context, however, it loomed large: halfway through my studies came an assessment confirming my own neurodivergence, provoking an unsettling blend of relief and fear. My initial reaction was to keep this knowledge to myself; I certainly wasn't about to undo decades of careful masking by writing about it. Unexpectedly, however, my research prompted me to reconsider: when exploring how environmental education might best address the crises we face, some of the literature I have found most convincing stresses the importance of sitting with discomfort, accepting uncertainty and paying heed to our emotional reactions alongside our cognitive responses. In this spirit I include this personal perspective here; despite my initial uncertainty, it has afforded me greater

awareness of something I now feel is crucial for environmental education and for addressing the polycrisis more generally. Through sharing a few examples from my work in Forest School, I hope to illustrate the importance, for *all* learners, of environmental education practice which accommodates – and is informed by – neurodiversity.

Insights from practitioners

A recurring theme in the interviews I conducted with Forest School practitioners for the first phase of my PhD research was the approach's benefits to neurodivergent learners. These interviews were punctuated by accounts of such children thriving in Forest School, their stories often recounted with gleeful recognition of the talents, imagination and potential largely overlooked in mainstream settings. As the following examples show, Forest School's success in this regard was attributed both to its ethos and facilitation, and to the freedom and nature connection the outdoor setting allowed:

"It's fascinating... the ways some children who aren't neurotypical will come to Forest School and how they will interact with the activities or the natural environment, and what they are getting from that, and how you, as a practitioner, can support their needs... For me, it's about observation and being adaptable". – Rowan, Forest School Leader for eight years

"One child, who was known as a bit of a 'troublemaker' [at school] ... couldn't cope in the classroom because of his ADHD... that situation was very triggering for him... But he had the freedom and the space in Forest School not to join in with the things he found stressful, so he totally calmed down and his classmates got to see a calm side of him. So I think often the children will see different things in each other [in Forest School] that maybe affect their perception." – Alex, Forest School Leader for six years

In many cases, the children they described had reportedly been labelled at school as difficult, low-achieving or requiring costly 'special' provision. However, the Forest School practitioners seemed to steer away from these deficit-based assumptions and towards a fundamental acceptance of myriad ways of learning, interacting and processing information. This was framed not simply as a result of their own practice or application of Forest School principles², but as a partnership with the setting itself. There, mainstream constraints dictating 'acceptable' ways of being were far less apparent, the comparative physical, mental and emotional freedom giving learners the space to negotiate when – and how – they interacted with their environment. Differing approaches to environmental

learning and engagement were not only permitted but were in themselves a source of ongoing learning for peers and practitioners alike.

Notes from the forest

At this point in my research, however, the relevance of such practices to environmental education more broadly seemed fleeting. Though different ways of learning were accepted, appreciated and on many levels integrated, this all took place within a very separate domain which, for most children, constituted only a tiny part of their lives. Forest School could perhaps provide small oases of freedom, its ripple effects visible to teachers and parents outside the setting, but its potential to counter exclusionary structures felt contained and limited. Starting from the position that radical change is required in environmental education if prevailing harmful attitudes are to be challenged, I wondered what – if any – genuinely transformative practice and learning was possible, and how this could be discerned. Ahead of my second research phase, in which I observed numerous Forest School sessions, I was also curious to see what this apparent appreciation of neurodiversity, which had unexpectedly peppered the interviews, would look like in practice – and what might be learnt from this.

As it happened, I was able to explore this area in some depth: my observation groups included those run specifically for children who had needs unmet by mainstream school, with neurodivergence a major factor. Over several weeks, I took notes on the learning, communication and interaction practitioners facilitated between the children and the environment around them. The following excerpts from these notes offer a glimpse of the varied and multifaceted ways in which these learners engaged with their surroundings, and the practitioners' role in enabling these:

Jay appears nearby, holding a wild garlic leaf... he stands still, closes his eyes and inhales its scent. David [Forest School Leader] asks him "do you like the smell of the garlic?" He nods, holding it up to David's face so that he can smell it too, before pulling the leaf close again and stroking it, saying "it feels soft". He then holds it up to his TA and me in turn, as we are both standing nearby, so that we can smell it. The scent lingers, its strength surprising. Jay smiles and draws it back; he continues to carry it as he walks towards the water barrel, periodically stopping to sniff it... Still holding the leaf, Jay looks up at David again and asks "David, when do they grow?" David replies "in the spring and summer... and when you come back next week, they'll have got bigger."

“If environmental education is to equip all learners with the holistic array of skills required to address current crises, it must draw on and incorporate a diversity of ways of learning”

On hearing the call to regroup, the children begin to shift their focus. Some head over directly, enjoying the chance to run at full tilt; others stop briefly to pick up something they've noticed on the ground, or cast a wider glance across the site. A few minutes later we have all joined the circle, sitting calmly as we wait to find out what will happen next... “OK, are you ready to do something different? We're going to try and be silent... every time we hear a new bird, we're going to point to where we think it is”. This instruction is given lightly, yet immediately the group falls silent. As a bird calls up in the trees, several of the children and accompanying staff point together in the direction of the sound. All the children remain silent for several seconds, focused on the tree canopy and the spots of sunlight visible through the leaves. Simultaneously, they point again when they hear the next bird call, arms outstretched, silently gazing upwards at the world above our heads.

What was striking about these settings was that no learner seemed out of place. Barring anything genuinely harmful, every mode of exploration and interaction – fast-paced, still, silent, noisy, cerebral, tactile or imaginative – was permitted. Accommodating all this did not preclude collective efforts; with everyone free to approach group learning in their own ways, the moments of unmistakable kinship between the children, adults and the other species within the site were all the more profound for not being forced. Even my own affective responses (safety; serenity; relief at the lack of pressure to process information in prescribed ways) differed markedly to those elicited by other educational settings I'd experienced. Here, it felt neurodiversity was not merely accepted but actively embedded in practice. Watching the learners thrive, I began to see these examples less as fleeting interactions and more as case studies in the necessary work of building gentler, more considered relationships with the natural world. Beyond simply offering an escape from everyday

restrictions, Forest School seemed to allow learners the space to relate to the species around them in ways that were not narrow or predetermined but sensory, cognitive, emotional and vastly varied.

Reflections for environmental education

Neurodiversity has been compared to biodiversity: as central to the success of our species as biodiversity is to healthy ecosystems³. If environmental education is to equip all learners with the holistic array of skills required to address current crises, it must draw on and incorporate a diversity of ways of learning. My observations of neurodivergent learners in Forest School, together with my own responses to these settings, left me hopeful that this is already happening. However, as long as such practices are confined to 'alternative' or specialist provision, their potential will remain limited: the forest may be visible, but the many important lessons taking place among the trees will be overlooked. These less conventional, often transformative, approaches must become more central to discussions of what effective environmental education might look like and how it can help us move beyond dominant destructive habits and assumptions. There are practical restrictions, of course: approaches like Forest School require time and money, neither of which abound in mainstream education. However, considering examples from these settings and examining the (often small) adjustments that make them possible may enable us to weave more of the necessary array of perspectives into everyday learning. Stopping to smell the wild garlic or silently follow the birdsong overhead may teach us more than we realise. H

¹ Department for Education. 22 June 2023. Special educational needs: analysis and summary of data sources. Available at: <https://www.gov.uk/government/publications/sen-analysis-and-summary-of-data-sources> [Accessed 30 January 2024].

² Forest School Association (FSA). (2024). Full principles and Criteria for Good Practice. Available at: <https://forestschoollassociation.org/full-principles-and-criteria-for-good-practice/> [Accessed 1 May 2024].

³ McGee, M. (2012). Neurodiversity. *Contexts*, 11(3), pp.12-13.

09 Bridging the gap: working within and against restrictive systems

What's the use of 'theoretical stuff'?

BY KAVITA KRISHNA

Kavita has had a varied career in STEM and has worked with rural and urban schools in India for over fifteen years. Currently living in England, she conducts maths support sessions, is the sustainability lead at a "Library of Things" and volunteers at a community garden.

While I was studying for my Master's in STEM Education, a friend asked, "What's the use of reading 'that theoretical stuff?'", echoing a question that other friends and family have asked in different ways. I had similar doubts before embarking on the programme. Working as a school science teacher before my MA, I was unsure about what 'theory' meant and how it was relevant to me as an educator. While scientific theories helped me make sense of the natural world in interesting and useful ways, I was less certain about theory in the context of education. Theory seemed far removed from the hurly-burly of schools and classrooms – something esoteric and impractical, better suited to the ivory towers of academia. Hence, heading back into university for the MA programme, I was curious, yet sceptical, about whether 'theory' could have relevance for me as an educator. In this essay I reflect on encounters with theory in the MA, particularly within the environmental education module, and how these interactions have shifted my understanding of theory and its relationship to practice.

Grappling with 'theory'

The importance of theory was highlighted early in the MA programme. Theory lurked, quietly (or loudly), in

every lecture or seminar where both the course material and lecturers referred to ‘conceptual frameworks’ and ‘theoretical perspectives’. Yet, these terms made little sense to me. Discussions with classmates were reassuring – I was relieved to hear that I wasn’t the only one befuddled by what ‘theory’ meant – but I was no closer to knowing why it was important. While the academic papers we read used theory as a backdrop to explain their research, my initial attempts at using theoretical frameworks in assignments, whether to make an argument or analyse a policy, felt clumsy, contrived, and sometimes even annoying. Was this insistence on a theoretical framework, a higher authority if you will, necessary to justify my opinions or analysis? Why did the irregularly shaped stuff of my thoughts and experiences need to fit into a neat theoretical frame? Was theory adding in any way to my knowledge and expertise as a practitioner?

After many hours spent poring over academic literature during the first term, I sensed a shift in my understanding. I began to think of ‘theories’ as abstract constructions with their own definitions, assumptions and logic. Theory seemed like “*a wondrous maze, fascinating precisely because of its often splendid lack of intelligibility*”. But I also began to realise that theory might offer a way of understanding what was happening in the real world of schools, classrooms and the community. In the following sections I illustrate how my understanding of theory and its relevance to practice has evolved since then through two anecdotes about my engagement with environmental education and local environmental issues.

Encounters with environmental education practice

My ideas about environmental education before the MA were predominantly shaped by my experiences as a science educator in India. While environmental education has been compulsory by law in Indian schools since 2003, and is integrated into different subject areas, in practice it receives desultory attention. My initial teacher training, like most training courses in India, didn’t prepare me to teach environmental education. Hence, when faced with a classroom of twelve-year-olds in a village school, I felt ill-equipped to teach science topics related to environmental issues. The content in the state-mandated textbook seemed dry, decontextualized and far removed from the concerns of my students and I struggled to make it meaningful and relevant. The curriculum alternated between stating scientific facts, describing environmental problems and instructing students to adopt pro-environmental behaviours. There was little attention paid



to the local contexts of students' lives. For example, the science textbook described water as a natural resource that needed to be conserved for sustainable use and exhorted students to save water by turning off leaky taps. This was an incongruous suggestion in a rural area where taps in the home were few and far between. Teaching environmental education, as it was presented in the textbook, left me feeling dissatisfied.

I attempted to make environmental education more engaging and relevant for my students by including a range of activities inside and outside the classroom. For example, in studying water, students did experiments in the classroom, surveyed water usage in their villages and recycled grey water to grow vegetables in the school garden. Although these activities seemed to enthuse and engage students, I had frequent doubts about my approach and grappled with many questions like: *Should I include more activities that encourage students' enjoyment of nature rather than see it merely as a resource? Should I initiate classroom discussions about modern agricultural practices that contributed to water scarcity in the area? Should we discuss the unfairness of a neighbouring holiday resort pumping scarce groundwater to fill its swimming pools?* Though I felt it was more important for students

“Planning activities for the term in a typical staff meeting would turn into animated, and often heated debates about what form of environmental education should be prioritised given the limited time available”

to understand and question systemic issues that were contributing to water shortages, rather than just to read about leaky taps, was this appropriate in a science classroom? Was I merely wasting precious classroom time in straying from the mandated curriculum? The further I strayed from the content in the textbook, the more questions I had about the purpose of environmental education and the best approach to take.

I encountered similar dilemmas among teachers when I worked in a progressive, elite boarding school located in the countryside. In this school, unlike most in India, there was a focus on environmental education with significant time allocated to environment-related extracurricular activities. In addition to studying environment-related content in the mandated curriculum, students went on nature walks, completed hands-on fieldwork and frequently debated topical environmental issues. While teachers from different departments were involved in environmental education both inside and outside the classroom, it became apparent to me that they did not always agree on what environmental education was and how it should be taught.

Planning activities for the term in a typical staff meeting would turn into animated, and often heated, debates about what should be prioritised given the limited time available. Anil¹, the chemistry teacher, felt that more environment-related topics could be integrated into the existing science curriculum. He argued that a better understanding of environmental science was essential in the face of the current environmental crisis. Kedar, the new biology teacher, disagreed. He pushed for students to spend more time in nature. Kedar argued that developing a love for nature would offer opportunities to develop environmental sensitivity which he felt was the bedrock of environmental education. He wanted students to go birdwatching, on nature walks, or sit quietly to observe trees in the weekly time allocated to environmental education. In contrast, Shankar, who taught design and technology, felt Kedar's ideas were too passive. He insisted that students needed

to solve real problems and do ‘useful’ activities. He argued that this would help them develop practical skills and cultivate environmental stewardship. He pushed for activities like digging compost pits for the school kitchen or desilting water channels on campus. On the other hand, Poonam, the English teacher, felt that developing empathy for the local landscape and community was more important. She felt it was important to get first-hand experiences of environmental problems and discuss possible solutions. She argued that this would inculcate a deeper ‘felt sense’ and awareness of the environment. She suggested that students spend time talking to people in the community and surveying local environmental issues. And finally, Raghav, the scholarly history teacher, felt that time was better spent understanding the systemic issues that led to environmental degradation. He argued that students should learn to think critically about the political and economic issues underlying local, national and global environmental problems. He wanted students to spend time learning from case studies, classroom discussions and debates.

As a relative newcomer to the subject, I listened to the discussions and arguments swirling around these staff meetings with increasing bewilderment. While each of these strongly held viewpoints seemed valid and reasonable, I was no closer to figuring out which version of environmental education was worth doing and why.

Reading Sauv 

During the MA, I chose the module on environmental education for several reasons. While an educational response seemed increasingly important given the unprecedented scale of current environmental problems, as an educator I was confused as to what environmental education was and what it could be. My previous experience had revealed a multitude of views, opinions and contrasting approaches to environmental education. I was also intrigued by the differences between environmental

education in India, where I had been an educator for many years, and the UK where I currently live and work. These varied experiences left me with many questions about the purpose and practice of environmental education. I hoped that the module would help me find some answers.

One of the first papers we read in the module was by Lucie Sauv , a Canadian academic and researcher of environmental education. In her paper *Currents in Environmental Education: Mapping a Complex and Evolving Pedagogical Field*², Sauv  acknowledges the multitude of ways in which environmental education is practised. She proposes a 'theoretical' typology of fifteen 'currents' to classify the variety of approaches. She highlights how each current conceptualises the environment in different ways and draws attention to the aims and teaching-learning approaches that each current prioritises. Sauv  also outlines the advantages and limitations of each current and highlights the questions that they raise about the approaches that we choose. Sauv 's influential framework has been a starting point for the critical analysis of practice and discourse in the field of environmental education for over fifteen years.

Reading Sauv 's paper for the first time took me back to the debates and discussions in the staffroom. I heard echoes of my colleagues' arguments reflected in Sauv 's currents. In the 'Scientific current', I heard Anil, the chemistry teacher's voice, arguing for a scientific approach to understanding and addressing environmental problems. Kedar's insistence on the importance of immersion in nature reflected the 'Naturalist Current'. There were echoes of the 'Problem-Solving Current' in Shankar's insistence on practical tasks to address local issues. Poonam's views on the importance of local landscapes aligned with the 'Bioregionalist Current', while Raghav's focus on broader economic and political issues reflected the 'Systemic Current'. Using the typology to classify my colleagues' opinions and my own views was reassuring – I now had categories and labels to sort out what had felt like a muddle about environmental education in my thinking. But the 'theoretical' typology gave me more to think about than mere classification. It also helped me consider what each of these perspectives focussed on, what they left out and the dilemmas they posed. In this way, Sauv 's theory helped me ask more nuanced and interesting questions about practice and the choices we make as educators.

For example, I noted that, by taking the 'scientific approach', Anil prioritised cognitive learning and saw environmental education as an extension of the science curriculum. This raises questions about the relationship between environmental education and science. For

“Raghav, the scholarly history teacher, felt that time was better spent understanding the systemic issues that led to environmental degradation. He argued that students should learn to think critically about the political and economic issues underlying local, national and global environmental problems”

example: Can social realities and values be effectively discussed in a science classroom? Should science teachers be trained to do this? Does environmental education lose its meaning if it is an “add-on” in school science?

Kedar, in advocating for being in and with nature (the ‘naturalistic approach’), suggested that developing a love for nature was a more worthwhile aim of environmental education. This raises questions, such as: *Is this a romantic view of how environmental issues could be addressed? Is an emotional bond with nature essential for developing environmental concern and stewardship?*

In contrast, Raghav believed an understanding of the socioeconomic and political issues underlying environmental issues was essential. *But is this sufficient for students to develop environmental sensitivity? Do students need to grapple with the systemic roots of environmental problems to be able to act pro-environmentally?*

And while Poonam’s focus on the immediate landscape and people (the ‘Bioregionalist Current’) might encourage a sense of belonging and care for the surroundings, it raises other questions: *Does this approach miss out on the global nature of problems like climate change? What is the role of culture in relating to the local landscape? Is the landscape perceived differently by a student from the elite boarding school and a student from the local village school?*

And what about the ‘problem-solving approach’ as advocated by Shankar—*Is environmental education primarily about teaching students to act and solve environmental problems or does environmental education have a broader aim? Is it unethical not to focus on concrete problem solving in environmental education given the environmental problems facing us?*

Theory also helped me become more aware of my own predilections and biases as well as the constraints faced by environmental educators in different contexts. I

“Kedar, the new biology teacher, disagreed. He pushed for students to spend more time in nature. He wanted students to go birdwatching, on nature walks, or sit quietly to observe trees in the weekly time allocated to environmental education”

thought of my discomfort trying to address environmental issues in the science classroom and recognized the dilemmas that the ‘Scientific Current’ poses for teachers who are not trained to address the ethical issues raised by the scientific facts. I noticed and questioned my focus on action-oriented approaches and problem solving that echoed the assumption in Indian textbooks that natural resources must be managed primarily for human use.

Encountering Sauvé’s currents in a community garden

Not long after I completed the environmental education module, Sauvé’s paper came in handy in an unexpected way. I found myself in the midst of a tense and acrimonious committee meeting in a local community garden* in England where I volunteer. The subject of the debate concerned a pond that had been created in the garden which now lay neglected. Different members of the committee had differing views on the future of the pond. Several members saw the pond as a problem – a danger to passers by, the site of vandalism and a dumping ground for litter. They wanted the pond filled in and closed off. Others saw the pond as a community resource – an essential part of the landscape, a site for children’s exploration – that needed to be restored through collective action. A third group saw it as a precious habitat that increased biodiversity, providing a haven for a range of insects, amphibians and birds. With Sauvé’s paper still fresh in my mind I was better prepared to disentangle this debate. The theory here helped me recognise the different conceptions of the pond and its purpose that each of these views revealed. As I stepped into the discussion and acknowledged what each of these perspectives highlighted – the values and priorities, and noted the gaps that each revealed – I sensed a shift in the mood, a greater acceptance of different viewpoints among the group. The theory, then, helped us take a step back from our strongly held views and acknowledge the range

of valid and valuable perspectives. Back home that night I emailed a copy of Sauv e’s paper to several committee members. And yes, a couple of them *did* read it and said they hadn’t thought about the environment or environmental education in those ways before.

Conclusion

Over the course of the MA I have become acquainted with a lot more ‘theoretical stuff’. Some of it has been relatively ‘light’ and easy to understand, some of it has been very complex and impenetrable. There’s been theory borrowed from other disciplines, and theory created for educational contexts. I now think of ‘theory’ as a box of varied, interesting and useful tools. These tools help me play with ideas and make sense of the social world. So, to my friend who asked, “What’s the use of reading all that theoretical stuff?”, I would say that ‘theoretical stuff’ has been useful in multiple ways. Engaging with theory has allowed me to connect the dots from different experiences and contexts and see patterns. It has nudged me to see the bigger picture and helped me to organise my thoughts and to support my efforts in choosing a response. It’s helped me to reflect on my practice, my opinions and biases in a systematic way. And it’s improved my ability to “*shuttle between levels of abstraction, with ease and with clarity*”³. But beyond its usefulness, I have enjoyed the process of grappling with theory: to delve into the minds of diverse thinkers, to explore new ways of understanding everyday experiences, and to encounter the unexpected insights that theory reveals. H

**Details and names have been changed to protect identities*

- ¹ Mills, C. Wright, and Todd Gitlin. (2000). *The Sociological Imagination*, Oxford University Press. (p.26)
- ² Sauv e, L. (2005). “Currents in Environmental Education: Mapping a Complex and Evolving Pedagogical Field.” *Canadian Journal of Environmental Education* 10:11–37.
- ³ Mills, C. Wright, and Todd Gitlin. (2000). *The Sociological Imagination*, Oxford University Press. (p.34)

10

Bridging the gap:
working within and against restrictive systems

A spiral of environmental education: theory to practice (and back again)

BY SOPHIE PERRY

Sophie is a final year PhD student at King's College London. Her research explores case studies of transformative environmental education.

January 2020

In 2020, I worked in science engagement. My role was varied: it involved programme planning, delivery, evaluation and writing funding proposals. With a background in biology and ecology, my favourite programmes were linked to environmental themes like soil health or the effects of nature on mental health, though my work also spanned other topics like artificial intelligence and the ethics of space exploration.

The organisation I worked for at this time was concerned with engaging young people, particularly those who were marginalised, with scientific issues that had implications for society. We hoped that creatively and collaboratively addressing these issues would benefit the young people, and by extension their friends, families and wider communities. I found developing programmes exciting and intuitive, but I continually wondered how the work *actually* affected the young people we engaged with. The funding streams we applied for demanded that we prove our worth by setting high targets for the number of learners we would engage, as well as the life-changing effects we would have on them. These applications drew from learners' positive feedback and projected our impact in the future. We spoke



of powerful and lasting programme outcomes, empowered learners, and the hopes we had for them to do something along the lines of 'go forth and change the world'. While securing funding to do our work relied on such superlative applications, I was sceptical as to whether what we were setting out was possible, let alone realistic.

I thought our work was worthwhile, but I wasn't sure how (and if) it could really make a difference. The themes I was most concerned with, like environmental and climate breakdown or consumerism and waste, were humungous *and* complex. How could one science engagement programme support learners to come to terms with these

I thought our work was worthwhile, but I wasn't sure how (and if) it could really make a difference.

issues, let alone to play a part in addressing them? That said, the alternative would be *not* to address these topics. In the shadow of an impending climate crisis, this did not feel like an option. From this position as a practitioner, I thought longingly about doing some research that would help me square these conflicting feelings... During that year, I thought up and applied for a PhD that would get to the bottom of things. I wanted to explore how programmes like mine might contribute not only to changes in individual young people, but changes in societies, environments and cultures. In other words, was addressing these 'big issues' through education and engagement making a difference?

March 2022

As spring made itself known in 2022, I was collecting data for my PhD. The focus of my research took my concerns borne from experiences in science engagement and applied them to environmental and sustainability issues specifically. I wanted to know how environmental education or engagement programmes might lead to necessary societal transformations. To explore this, I was observing environmental education programmes in practice and conducting interviews with educators and learners.

In March 2022 I was observing one of my case study programmes, run by a farming charity that had a partnership with a state school. The partnership enabled the charity to run outdoor education activities for the students at the school. The formal setting of this education programme was important for the charity, who hoped to "change the food culture in schools" by encouraging learners to be "out on the land and working with nature". The teaching was underpinned by mindfulness; each lesson started with a breathing exercise and students were encouraged to be mindful of the way they interacted with nature as they sowed seeds, grew crops and harvested vegetables. Occasionally, learners even delivered the organic food they had harvested to the school canteen, where it was cooked into students' lunches. Through these approaches, the partnership hoped to develop a future-facing school, in which a sustainable way of life was available to everyone.

But, as my observation notes highlighted, the cultures that dominate formal schooling sometimes clashed with or constrained the programme as it tried to transform the school into something more sustainable. While the partnership with the school gave the farming charity access to an extensive and diverse range of young people, it also came with a lot of rules and protocols that were restrictive. The programme could only work with a subset of learners,

once a week, in a specific timetabled slot. And at times, the outdoor farming educators ended up with little choice but to enforce school rules, even when those rules ran counter to the values and ideas that underpinned their work.

This experimental partnership between a farm and a school was exciting – its novelty was the reason I selected it as a case study. But it was also confusing for both learners and educators. For example, in a ‘normal’ lesson, the teachers were called Madam or Sir, while in the outdoor environmental lessons, the educators or facilitators were called by their first names. In a ‘normal’ lesson, students were told what to do, but during this programme, they were able to choose. ‘Normal’ lessons began with a register, but these ones started with a breathing exercise and a chance for everyone in the room to describe how they felt. In ‘normal’ lessons, students learnt *about* the environment, while in this lesson they were invited to connect *with* nature.

March 2024

I am still revisiting my field notes about that specific programme. By way of analysis, I try out different theories and consider if they explain what I observed. I consider whether the restrictions of traditional schooling undermined the transformative intentions of the programme. If the aim was to metamorphose the school into something that centred nature, then what does it mean that these alternative lessons which prioritised sustainability were ringfenced to once a week for a small group of learners? And did the ‘traditional’ priorities that dominated the other 95 per cent of learners’ school timetables ‘drown out’ this rare alternative experience?

These are questions I am still exploring two whole years since I collected ‘the data’ to which I refer. Environmental, climate and related social issues are urgent, yet I have spent the last two years reflecting on someone else’s programme, rather than contributing to any action myself. Once again, I find myself asking the same question that prompted the beginning of this PhD journey four years ago: is what I am doing – re-reading observation notes in the hope of finding ‘an answer’ – helpful? Does it, can it, make a difference?

At this point, I have come full circle. In 2020 I was embroiled in practice, craving the insights of theory. Today, I am knee deep in theory and ageing data, but itching to return to real interactions as they happen, rather than sitting inside and analysing them. I think this itch to make a difference, and the persistent anxiety that I might not be doing so, is not related simply to the merits of research

The cultures that dominate formal schooling sometimes clashed with or constrained the programme as it tried to transform the school into something more sustainable

or practice but, rather, to the enormity of the issues at hand. Global heating, environmental destruction, and their impacts on socio-ecological systems are unimaginably gargantuan. The way our dominant societies are paving a direct path towards climate breakdown is scarier than anything we have ever known. And in the shadow of this knowledge, it is hard for *anything*, be it research or practice, to feel sufficient.

Yet in some ways, my foray into research is beginning to answer the questions of practice I set out with. The theories I'm using, alongside insights from data, tell me that education programmes do make a difference. Granted, the changes realised are small and localised. Each instance of transformative environmental education is somewhat isolated – meaning it must battle the incumbent systems of unsustainability that dominate its unique context alone. For the farm school collaboration I observed, even the timetable seemed to represent a barrier to change. But slowly, such an initiative *is* having an effect on the school it works with; not just through the food students eat, but on supply chains the canteen buys from, and on the biodiversity supported by planting projects on school land.

In turn, the support that theory has lent practice also tells me that theory is helpful. Without theories that describe the slow, incremental, yet transformative and powerful nature of change, I might have lost hope altogether. In this way, theory and practice are two sides of the same coin. Both would be less valuable without their inverse. Theory, which can take the form of academic research, evaluation, or simply thinking deeply about your own actions is valuable *because* it enables further insights for action. Meanwhile, practice builds on these insights and, in time, demands further insights for the ongoing improvement of action. Theory educates practice, which educates theory, and so the spiral continues.

As I come to the end of my PhD, I'm left with a pertinent question about where I will be two years from now. Whether it is in the realm of practice or theory, or somewhere in between, I will be relying on the spiral that links them as I continue to reflect on and challenge structures and systems of unsustainability. H

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Bridging the gap:
working within and against restrictive systems

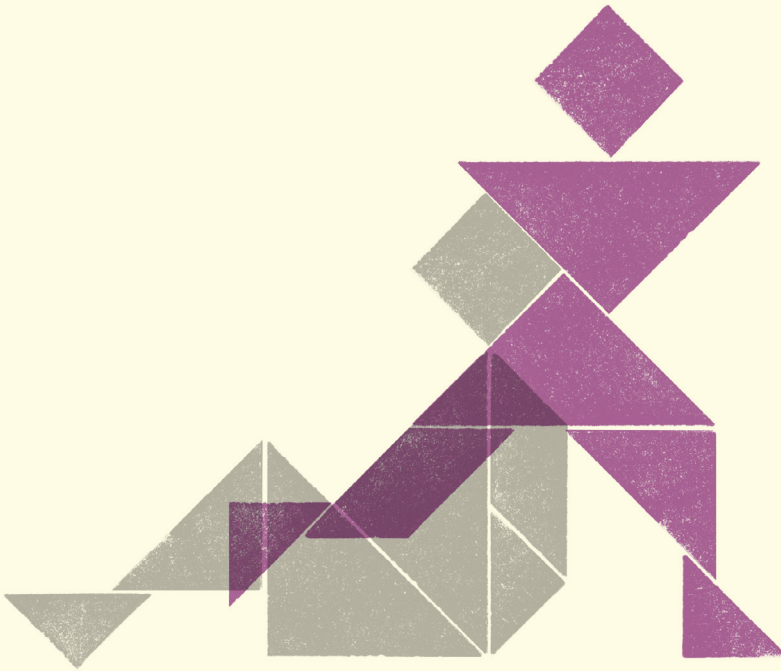
Doing more...

BY HEATHER KING

Heather King is a professor of science education at King's College London. Her research focuses on the experiences of teachers and other educators as they work towards social and environmental justice.

As a member of academic staff at King's College London, I work with remarkably bright, dynamic, and world-shaping individuals, both students and colleagues. And because I teach various courses, because I supervise research, and because I participate in faculty meetings, such people – although I still find it remarkable (imposter syndrome even as a professor runs deep) – listen to what I say. Having such a talented and attentive audience is both a privilege and an immense responsibility. I need to say the 'right' sort of things, and to impart the 'right' kind of thinking.

As a professor of science education, I teach modules spanning recent research developments in equitable educational practice, to the theoretical bases of repair, re-use and making in the context of STEM learning. I have many years of experience in researching social justice in science classrooms, and the implementation of environmental education in school curricula. As a former museum educator, I understand educational practices taking place outside of the classroom and thus also contribute to programmes exploring teaching and learning in the informal and cultural sectors. I have supervised students studying environmental policymaking, equitable access to



outside learning spaces and children's connections with nature. Last but not least, I personally love natural history.

Given the above, you'd think that I'd be in a great position to say something worth listening to with respect to the impending climate and biodiversity crisis and what we can do about it. And you'd be right. I understand the science which explains the environmental breakdown and I know the theories relating to how people think and learn. Yet I worry that people won't listen to what I say. Or that they will consider me to be cage rattling, and that I will be met with a wall of rolled eyes and a wave of exasperation. Many of my students (as practising teachers themselves) have their own students: the cascade effect of whatever I impart is potentially huge. And so, I am conscious that I will be squandering the remarkable privilege that I have when I fail to step up. I need to do more.

Recently, I have been working with colleagues to explore the ways in which Higher Education (HE) lecturers are able (or not) to address climate change in their everyday teaching. The work builds on our prior research examining the ways in which environmental issues are 'siloed' in

“you’d think that I’d be in a great position to say something worth listening to with respect to the impending climate and biodiversity crisis and what we can do about it.”

secondary schooling, rather than being considered across all subjects¹. In schools, teaching is constrained by the requirements of the national curricula, shaped by the specifications of exam boards, and variously affected by the many inequities at play in every classroom. In higher education, lecturers must still address issues of inequity in their practice but have much greater freedom to develop their own courses, curricula and assessment protocols. Yet even in these instances, we have found that it is extremely difficult for lecturers to ‘teach the future’ – provide their students with the knowledge, skills and opportunities in whichever disciplinary field they study to engage meaningfully with the environmental crises at hand. Individuals are limited by the wider institutional culture and bureaucratic regulations. Their efforts may also be curtailed by the expectations of colleagues and of students².

Having studied and theorised the factors affecting educators’ ability to challenge the *status quo*, I now understand the reasons for the inertia in my own practice. The scientist in me knows that this inertia will continue until it is changed by an external force. But the environmentalist in me knows that we don’t have time to wait for someone or something else to provide an impetus. It is up to all of us to push against the situation. However, I struggle to find the momentum from within.

Rather than be defeated and stay silent, a friend suggested that I take baby steps forward. The first is to acknowledge the weight of my concerns and accept that adopting genuinely environmentally just practices is difficult. The second step is to share my experiences, my doubts and my own inabilities in the spirit of offering others a view into how this work might unfold. This essay is thus me taking the first steps to stand up and do more.

My friend’s third recommendation was to try shifting my thinking and usual forms of expression to break loose of the knot I feel myself to be in. Normally, I am very rational. Writing in a more emotive, poetic way is not something I regularly do. Nonetheless, I accepted the challenge. The poem *Warning* by Jenny Joseph³ has long been a favourite of mine. Here, I use the shape and tone of the poem to scaffold my own inner call to action.

*When I am an old woman, I shall wear purple
And say exactly what should be said.
And I will say it loudly.
I shall not care (so much) about how people find me
I will sit down on pavements and shout
I will rattle the cage and rock the boat
Breed havoc, rear disarray.*

*I shall make up for the quietness of my youth and middle-age.
I will disobey the status quo
And learn to sit with discomfort
But maybe I ought to practice a little now?
Because this can't wait.
I need to be shouting today
Highlighting issues and demanding action
Urging colleagues and students to stop, to consider,
To not continue turning a blind eye.
It doesn't matter if I feel self-conscious
I need to do more, so it no longer feels odd
But becomes normal.
And changes happen.
I need to wear purple now. Not when I'm old.*

(with acknowledgements to Jenny Joseph's poem, *Warning*)

Over the last few terms, I have been conducting a mini, unofficial study on myself. I set a target of discussing the climate and biodiversity crises in every session that I teach, and I am documenting my success or otherwise. Thus, I have redeveloped my lectures notes to include references to the causes or implications of climate change on every page, and I raise questions about the resolution of environmental injustice in as many slides as I can. Sometimes this task is relatively simple, especially when I am the module leader! In other instances, I feel like I am a human shoehorn: addressing ideas around the sustainable use of resources during a session on how to write a literature review can feel incredibly unnatural. I fear that I will be faced with a wall of blank faces, even though I know that our students are similarly alert to global issues, and so my worries are surely unfounded. But still, I feel self-conscious, and I know that I am not addressing important ideas about sustainability or environmental justice with the volume and passion they deserve.

My colleagues have been helping me. I share my lecture notes and they have suggested additional content and approaches through which I might introduce issues more powerfully. They have observed my teaching and recommended ways to develop the course further next year. I have also been learning from wonderful activists and educators around the world who are striving to make their practices more socially and environmentally just (for example, see Andreotti's *Hospicing Modernity*⁴). Such work is inspirational.

Alongside my efforts in teaching, I also took a further pledge to champion the environmental perspective in all the administrative meetings I attend. To be fair, many of

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my colleagues are making similar stands and thus we are increasingly considering the impacts of our decision-making on the wider world. But on other occasions, the over-arching business-as-usual tone of such meetings can mean that our calls for change often appear to fall on deaf ears. At such moments it can be easy to feel like giving up, sitting back, keeping quiet. I could convince myself that as long as I am doing 'my bit' in my teaching and in my research that is enough. However, my own and others' research⁵ has shown that the practices of Higher Education teaching, research and administration are inextricably interlinked, and that action for environmental justice needs to occur across all aspects of university practice. Fortunately, colleagues across campus are stepping up, forming working groups, and making a difference.

In writing this essay, I have sought to acknowledge my insecurities around making a stand. I have taken some baby steps, but I know I need to do more, and I am very much trying to do so. If you are in any of my classes, or in any meetings with me, please help me out! You'll easily spot me: I'll be wearing purple. H

- ¹ Glackin, M., and King, H. (2020). Taking stock of environmental education policy in England – the what, the where and the why. *Environ. Educ. Res.* 26, 305–323. doi: 10.1080/13504622.2019.1707513
- ² Owens, J., Greer, K., King, H., & Glackin, M. (2023). Conceptualising HE educators' capabilities to teach the crisis: towards critical and transformative environmental pedagogies. *Frontiers in Education* (Vol 8) doi: 10.3389/feduc.2023.1193498
- ³ Joseph, J. (1992). *Selected Poems*. Bloodaxe Books.
- ⁴ Andreotti, V. M. (2021). *Hospicing Modernity: Facing Humanity's Wrongs and the Implications for Social Activism*. North Atlantic Books.
- ⁵ Facer, K. (2020). *Beyond business as usual: Higher education in the era of climate change*. Higher Education Policy Institute. Available at: <https://www.hepi.ac.uk/2020/12/10/beyond-business-as-usual-higher-education-in-the-era-of-climate-change/>

12

Feeling the research in our hearts and guts

BY MELISSA GLACKIN

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“It is not for a lack of intellectual understanding, it’s a lack of understanding from the gut, that is really going to make the difference [...] The argument is there, it is a compelling argument, but it has not reached the gut, it stays in the head”

Christiana Figueres was Executive Secretary of the United Nations Framework Convention on Climate Change (2010-2016) and led the process that secured the landmark Paris Agreement on Climate Change. She now co-produces *Outrage and Optimism*, a podcast we recommend to our students, that explores issues relevant to climate change, with a particular focus on geopolitical negotiations. Given Christiana’s experience, if there is anyone who will know how we might see our way through the crisis it is her. This is why the quote above seems so relevant to the work we prioritise on the MA module, *Environment, Sustainability and the Role of Education (ESRE)*. That is, Christiana is essentially saying we have all the scientific data and evidence to know that climate change is real and happening now, but our collective response is still non-urgent. Our house is on fire, and we are watching it burn. This disconnect between head and heart – or gut, as Christiana terms it – underlines the important role that environmental education must play if pathways between knowledge, emotions and actions are to be created and valued. Whilst research articles are central to our teaching, this work mainly connects with the head. In this essay I share two approaches we have been exploring during the module to bring academic

“In planning for the activity, I was very concerned that the stages inviting students to stand in front of another, one to one, would be too intense and uncomfortable for many. I was alert to how rarely we are intimate with other people in this way and how rarely we look at a friend straight on, let alone a peer in the classroom”

literature into conversation with our emotions: what we've termed 'pedagogies of hope'. As an educator, I offer personal reflections on both the joy and the challenges of doing this work, particularly within the university context, and share emergent thoughts of how the practices are beginning to transform my own understanding of my role as an educator in a time of the climate crisis. Before this, I'll introduce you to embodied pedagogies and *The Work that Reconnects* as ways into the marrying of heads with hearts and grounding our 'pedagogies of hope' approach.

Head Meets Heart

In Term 1, during the *Making and Creating in STEM Education MA* module, my colleague Heather King invites her students to connect with knowledges beyond the head to those experienced elsewhere in the body. In doing this, she asks students to consider how they participate in a ball game or riding a bike, before introducing them to the idea of embodied cognition, whereby human cognition is fundamentally grounded in sensory-motor processes and in our body's morphology and internal states. In Term 2, this understanding of the context of teaching about environmental issues, provides us with an approach to support the necessity of not just learning about the crisis, but also to experience the knowledge in our bodies, allowing for the union of head, heart and hands to inform our decision-making. Here our understanding of embodiment expands to place, increasing attention on the role that emotions play – and the importance of working with feelings such as anger, love, fear and ambivalence. In attempting to implement the ideas of embodied cognition, I have found Joanna Macy's *The Work that Reconnects*² an important resource. Her four-step spiral – *coming with gratitude, honouring our pain for the world, seeing with new eyes and going forth* – foregrounds practices that support physical and emotional responses to information that we



are cognitively processing, enabling a richer, relational understanding that can guide us to better informed decisions.

Pedagogies of Hope

Over the past few years, we have trialled varied approaches to encourage our students to experience environmental education beyond the written word of the academic journals. Often squeezed in at the start or end of seminars, we have adapted pedagogies met in our readings that inspire transformative practices, opening up different ways of knowing. These practices include Maori-inspired welcomes; providing a space for future generations via an ‘empty chair’; and meditations to connect with our ancestors and future descendants. They also include hosting a seminar beyond the walls of the university campus, within an ecology centre. However, whilst such practices were on the periphery, rather than at the centre of our teaching, we knew that they would remain as novel ‘extras’. So, in 2024 we introduced a day-long optional workshop inviting students electing the *ESRE* MA module to “join us in a courageous leap to play around with putting some of the module’s theoretical ideas into practice” to “consider how it feels in our hearts when we open up to the environmental crisis?”. My intention in advertising the workshop as such was to underscore how the session would be different from the traditional seminar format and that curiosity and

“doing this work can also help us loosen our grip on our own self-righteousness at being ‘right’ and knowing what is required.”

bravery were prerequisites. During the session, the students experienced a range of activities aligned with the four-step spiral, described above. Below I describe two of these activities from the perspective of the facilitator and reflect on what they offer our students in terms of embodied cognition in relation to the environmental crisis, as well as discussing my own response as an educator.

Connecting with the crisis – The Milling

The first activity, titled *The Milling*, invited the students to stand and mingle together in silence. Initially the students were asked to “move as if you are coming off the underground train, into College, where time is money, and you are a very important person”. This saw a room of hurried bodies being created. The next series of stages acted to gradually slow the students’ pace down, inviting them as they moved to begin to acknowledge others in the room, allowing them to start to make eye contact, and to realise ‘hey, I am not alone here’. From this, the stages gradually ask students to take in other participants, in a purposeful manner (including looking into the other’s eyes and hovering hands above theirs). Whilst still silent, the latter stages asked the students to stand in front of another and first just appreciate that that person had also decided to attend today’s session and was therefore similarly interested in the climate emergency. Following more milling, the students were invited to settle in front of another again and consider what strengths this person might have to give to the emergency at hand. After a final milling, the students stand in front of another to look at the person and take some encouragement that, like them, they knew about the state of the world and, like them, they were exploring how to be part of a solution. We finish by sitting down in a circle and reflect on our experience of the activity.

My reflections: The movement of the activity works to bring energy into the room. As traditional seminars are seated, often in rows, the formal rules of learning are discarded, which frees students to embrace the subject at hand: like children exploring a new adventure playground, they feel fear, mixed with excitement and a question

about where to start. In planning for the activity, I was very concerned that the stages inviting students to stand in front of another, one to one, would be too intense and uncomfortable for many. I was alert to how rarely we are intimate with other people in this way and how rarely we look at a friend straight on, let alone a peer in the classroom. Originally, I was going to abandon the activity as I didn't want students to feel awkward. However, I came to realise that experiencing and being with the awkwardness and uncomfortableness was a significant part of the practice in that, for us to make decisions for the greater good and remain motivated in addressing the climate emergency, we need to form connections with others and to feel unity. Providing opportunities to support this type of learning – the learning that needs to be experienced by multiple senses.

Seeing the world with new eyes – Widening Circles and Voices

The second activity, titled *Widening Circles and Voices*, invited students to walk in others' shoes. In small groups, the students are invited to choose a particular social or environmental issue that concerns them, for example, a local housing development, a river contaminated by sewage or the location of an offshore windfarm. For a couple of minutes, in silence, the students individually consider their issue from their own perspective and reflect on why it is such a concern. Then, they are invited to speak to their group about the issue, introducing themselves and sharing why they have chosen the topic. The next three stages ask the student to take on a different perspective of the issue; that is, to put on some different shoes. First, the perspective of a person who holds an opposing view of the issue. Second, the perspective of a non-human that is affected by the issue. And third, the voice of a future human whose life will be affected by the choices made. To encourage further embodiment, the students are asked to speak as the person or non-human, using the pronoun 'I' throughout.

My reflections: Joanna Macy reasons that being able to embody others' lived experiences will support us to maintain motivation and energy when we eventually meet diverse and potentially jarring perspectives when it comes to the environmental crisis. She also notes that doing this work can help us loosen our grip on our own self-righteousness at being 'right' and knowing what is required. I love the potential of this: that an activity can support a student both to get inside another's world view and to challenge their own. By embodying different

perspectives, particularly those with a contrasting – and perhaps antagonistic – view (for example, the boss of a petroleum company), it can help us to remember that these, like us, are people with dreams and desires. And for many taking the position of a non-human, be it a lichen, limpet or lemur, this is a novelty which can bring playful joy. Seeing the world from a non-human perspective challenges ecological hierarchies and potentially seeds the idea of our universal interconnectivity. As the activity stands, though, I realised it was ‘entry level’! That is, the role-playing was limited to short monologues, disembodied from the physicalness of the being. To encourage deeper embodiment of standpoints, students would need to spend more time in character, perhaps dressing up in role, for example making masks, and considering more the backstory of the other. Such storying would encourage more of themselves to be put into the shoes of others.

The work of transformative practices

Universities have established ways of being, and of learning, which act as enablers and challenges to the introduction of embodied pedagogical practices. Educators and students come with expectations of one another, with institutional structures reinforcing these behaviours. Curriculum time, for example, is limited, and content essential to the assessment needs to be delivered. The Master’s assessment criteria are standardised, privileging critique and creativity, but predominantly via the written word. Some might therefore believe that time spent including embodied practices in sessions is a frivolous extra, a novelty which can be sidelined when the impediments of time or appetite are met. However, my experience to date is that these practices work in unison with the cerebral, enabling the sentiments on the page to be revisited, to be considered from a different angle and in new light. That is, to be creative in assignment responses, to really be able to critique and consider a range of (researchers’) perspectives, the embodied practices provide authentic opportunities to develop this form of thinking. Embodied pedagogies can support students to be in relation with ideas promoted in the journals, seeing them in multi-colour.

Student academic achievement is important. However, given the crisis at hand, our students need broader skills to co-create futures without a script or blueprint. To me, the pedagogies of hope practices offer one such tool to encourage these alternative, but essential, abilities. From the capability to see another human with (different) needs and not to turn away, to understanding that non-humans aren’t here to serve our needs: the tool offers a method

“This work is joyful and challenging – like being on a rollercoaster whilst operating it at the same time.”

to experience our interconnection and reliance on one another. This is important work if my university is to achieve its stated goal of making the world a better place and to serve its community.

And as to me? This work is joyful and challenging – like being on a rollercoaster whilst operating it at the same time. It is an honour to be able to offer students potential keys to unlock emotional responses to environmental-related issues; however, it also feels terrifying not knowing how they will be received or responded to. The bridge between the academic papers and the practices needs a personal engagement, a different type of enquiry, which can only be generated from the individual student. So whilst my attention is currently focused on how I might refine and develop practices that help build the bridge, I have learnt that students also need to be ready to feel vulnerable and willing to hold the space of unknowingness as part of the process. In essence, at the start of this work, we all need to acknowledge that our heads are doing so much work, so much of the time, but as Christiana reminded us in the quote at the start, the real work now is to learn to feel it in our hearts and our guts. H

¹ Figueres, C., Rivett-Carnac, T., & Dickinson, P. (2024, 12 April) Two Years to save the World? With Simon Stiehl (No. 240) [Audio podcast episode]. Outrage & Optimism, <https://www.outrageandoptimism.org/episodes/two-years-to-save-the-world?hsLang=en>

² Macy, J., & Brown, M. Y. (2014). *Coming back to life*. New Society Publishers Gabriola Island, BC.

A space for your reflections...

What has spoken to you as you've read our chapters?
What connections have been made? What new questions
have been seeded? And how do they look and feel in your
heart, your head and your hand?

A large, empty white rectangular box intended for user reflections. It occupies the central and lower portion of the page, providing a space for the reader to write their thoughts in response to the prompts above.



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