



THE UNIVERSITY *of* EDINBURGH

Edinburgh Research Explorer

Tensions, knots, and lines of flight

Citation for published version:

Clarke, DAG & Mcphie, J 2020, 'Tensions, knots, and lines of flight: Themes and directions of travel for new materialisms and environmental education', *Environmental Education Research*, vol. 26, no. 9-10, pp. 1231-1254 . <https://doi.org/10.1080/13504622.2020.1825631>

Digital Object Identifier (DOI):

[10.1080/13504622.2020.1825631](https://doi.org/10.1080/13504622.2020.1825631)

Link:

[Link to publication record in Edinburgh Research Explorer](#)

Document Version:

Peer reviewed version

Published In:

Environmental Education Research

Publisher Rights Statement:

This is an Accepted Manuscript of an article published by Taylor & Francis in Environmental Education Research on 25/9/2020, available online: <https://www.tandfonline.com/doi/full/10.1080/13504622.2020.1825631>.

General rights

Copyright for the publications made accessible via the Edinburgh Research Explorer is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

The University of Edinburgh has made every reasonable effort to ensure that Edinburgh Research Explorer content complies with UK legislation. If you believe that the public display of this file breaches copyright please contact openaccess@ed.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.



Tensions, knots, and lines of flight: themes and directions of travel for new materialisms and environmental education

David A.G. Clarke and Jamie Mcphie

Please cite as: Clarke, D. A. G., and Mcphie, J. (2020): Tensions, knots, and lines of flight: themes and directions of travel for new materialisms and environmental education, *Environmental Education Research*, DOI: 10.1080/13504622.2020.1825631

Abstract

In this introduction to a special issue of *Environmental Education Research* on New Materialisms and Environmental Education, we begin with a brief overview to this publishing project and to scholarship on new materialisms and environmental education. Against this backdrop, we then discuss various themes of significance arising from the broader tumult of thought that occurs in the 17 papers that bring these areas into conversation. In brief, papers gathered in this collection illustrate a series of engagements with: (1) new empiricism and post-qualitative inquiry; (2) the meeting of politics, ethics, and decolonial theory with new materialisms; (3) conceptions of nature, environment, sustainability and the human subject; and (4) new materialisms as environmental pedagogy. We recognise that readers will imagine, detect and respond in diverse ways to the papers and the thematics on their own terms too, noting that other inclusions in the collection would likely have generated different patterns and affordances for insight, challenge and debate. Thus, we argue that in some senses, the collection must remain open rather than closed, while we also invite further contributions on the topics, that engage with what the collection does and does not offer, and to rework it. In other words, we trust our introduction underscores the immanent performativity expected of many of the new materialisms, and highlights their potential to forge axiological pathways away from dominant onto-epistemologies of environmental education research.

Keywords: *Environmental Education Research, New Materialisms, Immanence, Post-qualitative, Decolonial Theory, Nature, Pedagogy.*

Decoupling endings as a curious place to start

When we issued a Call for Papers for this special issue of *Environmental Education Research* in April 2017, we were acutely aware of currents of work in environmental education and its research that had ebbed and flowed on the conception and experience of matter, and the ‘re/turn’ to the material. But it was often unclear to us what further ramifications, implications and performativities might be of the associated materialisms which were being invoked, criticised or offered as generative in this work. Some of this work seemed to rely on a continuum of uncritical-critical-postcritical materialisms, and were prone to position their authors or interests in a vanguard accordingly. Others sought ways to supplant the ‘old’ with the ‘post’ or the ‘new’, perhaps in terms of research design or questions, but increasingly through categories and preferences in theory and theorists, that sought to destabilise and re-imag(in)e what or who was appealing or authoritative in governing the field of practice and inquiry. If we were struggling to make sense of this, we reflected, we were probably not alone. So, we looked for opportunities to invite our colleagues to join us on a series of departures and sense-making journeys, reckoning more deeply, we hoped, with the aforementioned pulses and debates, and helping clarify some of this proliferation and its possible confusions. In short, our intention was to better engage the contributions and challenges new materialisms might offer, as one of the latest incarnations of engagement with new theory and praxis in environmental education.

In our wider work, we had already started examining some of the specific issues and implications that the new materialisms might raise for the field of environmental education (see Clarke, 2017; Clarke and Mcphie, 2014, 2016; Mcphie, 2018; Mcphie and Clarke, 2015, 2018; Clarke, 2019). While with the encouragement and support of the journal’s board, we proposed to guest edit a special issue that would broaden and deepen such conversations. Looking back, we had hoped that the special issue would act as a site that brought about both a tightening and loosening of various potential tensions and entanglements, ‘knotted’ or/and ‘fabricated’ as they seemed to us, around the ethical, the practical, the methodological, the historical, and, of course, the pedagogical. And in this introduction, and the accompanying editorial essay, we illustrate how we and others have wrestled with these challenges.

But first, to further contextualise our interests in broadening the conversation, if another truth were told, these were spurred by our own research challenges. We had each failed, in a similar manner to St. Pierre (2014), to reconcile and integrate prevailing humanist qualitative research

approaches with a burgeoning new materialist and posthuman literature. Our stumblings were further complicated in that neither stable notions of the environment, ecocentric perspectives *nor* discursive approaches seemed to make sense for us anymore. At the time of the call, we had already identified a broad movement within environmental and sustainability education (ESE) which appeared similarly engaged with considering the implications of a (re)turn to the material (e.g., Adsit-Morris, 2017; N. Gough, 2016; Malone, 2016; Malone, Truong, and Gray, 2017; Payne, 2016; Tuck and McKenzie, 2015; Van Poeck and Lysgaard, 2016). These attempts, we felt, aligned with a rich history of environmental education scholarship that has engaged, and continues to contemplate, fundamental questions about being, knowing, and the axiological for research and practice development. In this regard, recent moves to engage new materialist theory with environmental education research/policy/practices were subsequently discussed with colleagues at a PhD summer school of the European Educational Research Association Network 30 on ESE research, organised by Elsa Lee at Homerton College, University of Cambridge in 2016. And if there was a singular moment of crystallisation, it was somewhere there, in between the lecture halls and libations, that the idea for creating a platform for further exploration, deliberation and debate via a special issue took first form.

After various negotiations and iterations, the call was published (a copy can be found at <https://eerjournal.wordpress.com/tag/new-materialism/>). But in this introduction to the collection, rather than rehearse that, we rather flag that in tracing the origins of this particular upwelling of interest in the ESE community, readers will detect strong echoes in the argumentation and citation patterns of the turn to new materialisms in the broader academy, primarily in relation to the cultural studies, humanities, and the social sciences. These concrete practices of scholarship might be regarded as evidence of inquiry more broadly becoming more closely aligned with long-lived, but sometimes buried, questions of fundamental significance to environmental education and the related fields of environmental philosophy and environmental ethics, and more recently, the environmental humanities. Indeed, one recurring argument for the prefix ‘new’ has been that we are in new times, politically, technologically, and environmentally (Coole and Frost, 2010). Unpacking this, politically, many Westernised cultures have seen shifts to populism along with an increasing far-right presence that preys on fear, sorrow, and loss to force an agenda of isolationist propaganda. In terms of the Overton Window - the range of policies politically acceptable to the mainstream population at a given time – this particular ‘window of discourse’ has shifted so much in socio-political spheres that what had once seemed abhorrent (to many liberal progressives) has too often become the norm.

In short, the orthodoxy of liberal democracy is threatened in this authoritarian age, and that includes its cultural institutions (Applebaum, 2020; Gessen, 2020), such as public education and publicly-funded research and inquiry. However, amid this shifting political milieu there is also an invigorated youth and antiracist movement for environmental and political justice, challenging both contemporary alt-right as well as institutionalised ways of being. Questioning what schools are really for, and being used for, in times of deepening climate emergency, has become a key challenge for society from these social movements and activists, as well as to ESE, iconized in the life and trials of Greta Thunberg. Inseparable from these developments are the decentralisation of ‘news’ and media consumption in the turn away from legacy media. As seen – or more to the point, not seen - in the activities and coverage given to the work and networks rallying around Extinction Rebellion, there is potential but also a cloaking nature of ‘organic democratisation’, providing opportunities to the grassroots whilst allowing the powerful to subvert new and alternative media platforms, ‘faking’ what is going on, be that on the ground, and in the airwaves, so to speak.

These intersecting themes make their presence felt and recombine within the flux of the material in nonconventional ways, as in ‘advances’ in human gene editing and events such as the birth of a three parented baby. Commentators note we have not only become cyborgs - where our presence is now stored in our phones and dispersed in vast data storage centres - we are also becoming outmoded and *remoded*. As an increase in robotization and artificial intelligence leads to ‘breakthroughs’ at the interface of the ‘human’ and the ‘technological’, so too will it lead to increasing income inequality as well as increases in xenophobia (Gamez-Djokic & Waytz, 2020). These developments produce a contestation in the manner in which we understand ‘the human condition’; including as either transhuman or posthuman: ‘the former signifies an intensification of Enlightenment humanist thought, while by contrast the latter typically denotes normative distancing from the canons of violence and subjugation associated with the humanist project’ (MacFarlane, 2020, p.2). These vastly divergent visions of what it is to be and become human can also produce political movements and shifts in the public imaginary: each has direct and divaricating implications for how the environmentally concerned might act, and how critical perspectives on these matters are formulated or prosecuted.

Equally, in what might generally be thought of as a more ‘earthly’ register, we continue to see seismic shifts that have dramatically altered ways of life which had once seemed stable - at

least for the more privileged, who make-up only a minority of the world's human population. The least privileged, the majority, battle ever increasing temperatures, air pollution, rising waters, and depleted lands, and have been doing so for some time – or more specifically, increasingly do so since the onset of the most recent incarnations and centuries of industrialisation and globalisation. For the most privileged of the now, these changes might sometimes strike up close with the lived experience of extreme weather events, but also with an uncanny presence/distance as we see/hear rumours of a new 'record' reported in the news – instruments in Furnace Creek in California documenting a smothering 54.4°C in August, 2020. The spectre and data of catastrophic environmental crises can seep into our lives indirectly, rendering us ontologically disoriented as we grapple with felt ethical imperatives whilst being imbricated in a globalised carbon dependent economy. Of course, worlds have always ended, and it is not necessarily the speed or extent of this change that marks it apart. It might instead be the fact that we are the ones witnessing this change, and this pain, now. Despite the wide effects, we only register changes as *crises* when they are ours to feel.

Pulling this deeper into the current moment by adding epidemiological and epistemological dimensions to the mix, the coronavirus pandemic alters thoughts and behaviours, whilst revealing and reinforcing certain economic, social, and political tensions of our times. Some argue the Coronavirus has 'piggybacked on racism' (Hattenstone, 2020) and contrary to received wisdom, it does discriminate, because it becomes a part of us, inseparable from our cultural constructions. Similarly, contemporary scientific insights reveal that the human biome depicts 'us' as more symbiotically alien than traditional biological or cultural narratives of the human would have us believe - as a singular, skin-bounded unit of flesh and bone. We, human and other-than-human, are a conglomeration of multiple species from mites, bacteria and fungal mycelium to water, minerals, electricity, chemicals, and viruses, but *also* material-discursive drives and performative concepts, furthering the material and posthuman perspective. Similar to viral contagions, micro and nano-plastics have now entered the troposphere, hydrosphere, lithosphere (plastiglomerate rocks) and biosphere (recently found in human organs, adding plastic - and oil - to the conglomerate human biome - the anthropoglomerate), causing the potential for unmitigated environmental disasters as we find ourselves ever more dispersed in the Plastocene (Carrington, 2020; Mcphie, 2019; Preston, 2017; Wright and Kelly, 2017). These changes have collectively kick-started a worldwide depression - economic, medical, spatial, temporal, and (environ)mental - all new, all material.

This ‘newness’ to our times is signalled particularly, we feel, by the emergence and prominence of the term ‘anthropocene’. It can be further witnessed in the ways this term creates novel jumping off points for (and even the purported ‘death’ of) environmental education (Le Grange, 2019) due to its performative effects and the contemporary conditions it is meant to describe. In regard to wider debates, we might imagine the new materialisms as a sort of ‘ecologising’ of social science (see Murdoch, 2001, and Affifi, Blenkinsop, Humphreys, and Joldersman, 2017), but an ecologising which, at its most complex/sticky/critical, wrestles deeply to extricate core binaries which remain alive and (un)well in the idea of the ‘ecological’. In fact, we might also be drawn to ponder the potential for ‘ecologising’, where the weight is placed on *doing*, to demonstrate the always ongoing nature of deconstructing the world as understood as a correlate of human thought.

Wherever we find ourselves with such twists and turns though (including the possibility of profound disorientation), together, and with others, we wondered what work might be being done by those we knew, and those we would like to know, who might treat these topics as, in some way or other, matters that could be addressed by bringing environmental education into closer proximity, even co-mingling, with the new materialisms. To that end, our call for scholarly papers on these matters has been a success. But while a special issue can never be considered as a snapshot of the state of affairs of a topic, we were both pleased and surprised at the extent of the response to the call, both from established and early career scholars. So abundant was the response, that we have been able to accept two issues worth of papers for publication. And as such, we trust this collection affords a wider range of perspectives on new materialisms employed, and thus runs a fuller gamut of criticism, caution, application, and wholehearted endorsement, than initially anticipated.

We begin the special issue with this introduction to the collection. It offers a brief overview of new materialisms, with a specific focus on feminist new materialisms, before going on to discuss the ways in which some environmental education research has been moving with this ‘turn’. We close this introduction with a reflection on various tensions, knots, and lines of flight which, whilst not derived directly from the papers that make up this special issue, we nonetheless see as potential themes and directions of travel for new materialisms and environmental education research. In our second paper, an editorial essay, we introduce the 17 papers that make up the special issue, outlining our sequencing of them in relation to themes we see emerging from their contributions.

New materialisms

The terms ‘new materialism’ and ‘neomaterialism’ were coined by both Rosi Braidotti and Manuel DeLanda independently of each other in the second half of the 1990s (van der Tuin and Dolphijn, 2010). However, a move (back) to materialist-process thinking in the social sciences can perhaps be traced to, for instance, Latour and Woolgar (1979), as well as having links to other process-oriented philosophies of the 20th century, i.e., the work of Alfred North Whitehead and Gregory Bateson. But we could go further, rooting out other influences and influencers of new materialisms, be that travelling back to Heraclitus, animistic Celts and Baruch Spinoza, the historical materialism of Friedrich Engels and Karl Marx, and certain (post)phenomenological perspectives in Western thought, or looking to more contemporary similarities from other cultures that might align more ontologically, epistemologically or axiologically with new materialist sensibilities, such as certain forms of Buddhism (Nagarjuna’s or Ambedkar’s) or contemporary animisms (Mcphie & Clarke, 2015). In this sense and reckoning, new materialisms are not really new, in that many First Nations ontologies have been appropriated on the way to constructing ‘the Material Turn’, a point we will revisit presently.

The ‘New Materialisms’ has thus become something of an umbrella term used to encapsulate a more general turn in academic circles towards revisiting ontology in light of contemporary political and environmental events and their historical antecedents. Often referred to as ‘the Material Turn’, it has now spread, in tentacular and rhizomatic fashion, across many disciplines. These include, but are by no means limited to: children’s geographies and education (e.g., Crinall, 2019; Cutter-Mackenzie-Knowles, Malone & Barratt Hacking, 2020; Diaz-Diaz & Semeneć, 2020; Malone, Tesar & Arndt, 2020; Merewether, 2019; Myers, 2019; Rautio & Stenvall, 2019), human geography (e.g., Anderson & Wylie, 2009; Foreman, 2020; Whatmore, 2006), drama and performance studies (e.g., Schneider, 2015), philosophy (e.g., Latour, 2005), medical practice (e.g., Mol, 2002), archaeology (e.g. Whitmore, 2014), sport, exercise and health studies (e.g., Thorpe & Clark, 2020), mental health (e.g., Duff, 2014; Fox, 2016; McLeod, 2017; Mcphie, 2019), critical studies of men and masculinities (e.g., Garlick, 2019), quantum physics (e.g., Barad, 2007), international relations (e.g., Lundborg and Vaughan-Williams, 2015), politics (e.g., Bennett, 2010; Braun & Whatmore, 2010; Coole & Frost, 2010; Latour, 2004), research (e.g., Fox & Alldred, 2014; St. Pierre, 2015), and

decolonial studies (e.g., Rosiek, Snyder and Pratt, 2019; Smith, 2017). Thus, this special issue of *Environmental Education Research* also provides a space and place to acknowledge the potentially deep implications that new materialisms prompt for theory, research and practice in environmental education.

But what is a new materialism? Whilst encapsulating a broad move toward ontology and the materially real, there is neither a singular nor settled definition, or encapsulating philosophy. As with the brief sketch above, there is, of course, an enduring though varying focus on materiality in the history of Western thought, despite materiality sometimes appearing marginalised (Coole and Frost, 2010). While it is not our intention to provide an overview of this here, for the purposes of this special issue, we detect that the main thrust of the new materialisms is an attempt to (re)turn to, renew, or create better philosophies of matter. Such philosophies are an attempt to offer a response to contemporary scientific revelations, the intractability of the social and environmental, and a perceived over-reliance on discourse and language in the so-called post-modern era of philosophy and social science. In short, ‘new materialists’ posit that, philosophically speaking, inquiry in the social sciences and cultural studies in the last several decades has paid too much attention to theorising and interrogating subjectivity, at the expense of similar but different considerations of matter, owing to a perceived inaccessibility of the material world:

There is an apparent paradox in thinking about matter: as soon as we do, we seem to distance ourselves from it, and within the space that opens up a host of immaterial things seems to emerge: language, consciousness, subjectivity, agency, mind soul; also imagination, emotions, values, meaning, and so on. These have typically been presented as idealities fundamentally different from matter and valorized as superior to the baser desires of biological material or inertia of physical stuff. It is true that over the past three decades or so theorists have radicalized the way they understand subjectivity, discovering its efficacy in constructing even the most apparently natural phenomena while insisting upon its embeddedness in dense networks of power that outrun its control and constitute its wilfulness. Yet it is on subjectivity that their gaze has focused. Our motivation...has been a conviction that it is now time to subject objectivity and material reality to a similarly radical reappraisal (Coole and Frost, 2010, p.2)

Whilst there are disparate strands in the new materialisms, affinities between philosophies and theories that have attempted to move beyond discursive or linguistic accounts have been identified. Connolly (2013) for instance, acknowledges that whilst escaping discourse seems difficult, we have never been able to truly escape matter, and thus new materialists offer various forms of contestable metaphysics. Their work is often characterised by an interest in the implications of ontological positions for first order concerns such as agency, time, subjectivity, objectivity, and knowledge. But it can be more or less than this. Specifically, new materialist theorists ‘find it essential to bring such a cosmology into play in concrete explorations of ethics, state politics and global politics, exposing by contrast and comparison as we do so conventional cosmologies now tacitly in play in the human sciences’ (Connolly, 2013, p.400).

The political potential of the new materialisms has been particularly attractive to feminist scholarship of the last few decades. First, the political effects of troubling pre-given ontologies is perhaps one of the fundamental characteristics of the various new materialisms. Ethical concerns both inform and spring from a general troubling of those concepts that are often taken, ontologically, as relatively stable in developing policy, theory and research approaches. New materialisms explore the possibility of post-dualistic conceptions of agency and body (and/or mind). They can be deployed in the ongoing questioning of axiomatic distinctions between what is ‘natural’ and what is human or human derived, and thus trouble common conceptions of life as deriving solely in the organic, as in Jane Bennett’s *Vibrant Materialism* and materially informed contemporary animism (Harvey, 2013).

Together, these attempts can be read and used to question the nature of the political, and the location of ethics and culture. More concretely, troubling established dualisms by way of a new materialism might be spearheaded by attempts to articulate forms of protean monism (Connolly, 2013). For instance, in reference to the nature culture dualism, van der Tuin and Dolphijn (2010, np) offer that:

New materialism is a cultural theory that does not privilege culture, but focuses on what Haraway would call ‘naturecultures’. It explores a monist perspective of the human being, disposed of the dualisms that have dominated the humanities until today, by giving special attention to matter, as it has been so much neglected by dualist thought. New materialism, a cultural theory inspired by the thoughts of Deleuze, that spurs a renewed interest in philosophers such as Spinoza and Leibniz, shows how cultured humans are always already in nature, and how nature is necessarily cultured, how the

mind is always already material, and how matter is necessarily something of the mind. New materialism opposes the transcendental and humanist (dualist) traditions that are haunting a cultural theory that is standing on the brink of both the modern and the post-postmodern era.

As an example of the ties to many First Nations ontologies, in keeping with the promise of respectful dialogue and acknowledgement, Standing Rock Sioux author Vine Deloria (1999) emphasised ‘Indians do not talk about nature as some kind of concept or something “out there.” They talk about the immediate environment in which they live’ (p. 233). This relational, non-dualistic perspective has been, and is still, prominent in animistic thought, and has seeped into the material turn via a host of prominent scholars (and environmentalists), influential to new materialist writing (e.g. Spinoza, Bateson, Deleuze, Haraway, Barad, Bennett, Latour) and who have held on to its ethico-onto-epistemological potentials (see Mcphie & Clarke, 2015).

However, new materialisms refuse to be one thing – yet! (although it may seem they are rapidly becoming so?). For instance, speculative realism (often in the form of object oriented ontology, or OOO), feminist new materialisms, new empiricisms, the ontological turn, PhEmaterialism, as well as an emerging material ecocriticism are prominent labels that have arisen, amongst others, to engage within/beyond the spirit of new materialisms and otherwise, with some of the binaries highlighted above. Each of these trajectory-tributaries have been discussed widely, and it is not our intention to explain the similarities and differences in this editorial, although you can find evidence of doses of each of these concepts throughout this special issue. However, we feel the need to further introduce the prefix ‘feminist’ as it performs some-‘thing’ effectively (and affectively) in an equitable direction of travel.

Feminist new materialisms

Feminist new materialisms focus on ‘how the forces of matter and the processes of organic [and in-organic] life contribute to the play of power or provide elements or modes of resistance to it’ (Frost, 2011, p. 70). In this way feminist new materialisms are positioned as fundamentally political. Material feminists acknowledge how feminist theory and practice have been significantly enriched by the exploration of power, discourse and performativity of postmodern feminism. However, acknowledging the work of, for instance, Donna Haraway

and Clare Colebrook, material feminists argue for a return to matter so as to allow exploration of the effects and affects of bodies and the myriad material conditions of power:

The retreat from materiality has had serious consequences for feminist theory and practice. Defining materiality, the body, and nature as products of discourse has skewed a tremendous outpouring of scholarship on “the body” in the last 20 years, nearly all of the work in this area has been confined to analysis of discourse about the body (Alaimo and Hekman, 2008, p.3).

Further, and significantly, the environment, non-human, more-than-human, or other-than-human are each positioned as upfront concerns in feminist new materialisms. This concern arises both as a result of the challenging environmental conditions of the 21st century and in response to the need to critically address ‘nature’ from feminist positions. Yet despite the critical work of Carol Merchant, Val Plumwood and others, the concern here is that mainstream feminist theory:

relegated ecofeminism to the backwoods, fearing that any alliance between feminism and environmentalism could only be founded upon a naïve, romantic account of reality...The problem with this approach, however, is that the more feminist theories distance themselves from “nature”, the more that very “nature” is implicitly or explicitly reconfirmed as the treacherous quicksand of misogyny. Clearly, feminists who are also environmentalists cannot be content with theories that replicate the very nature/culture dualism that has been so injurious—not only to nonhuman nature but to various women, Third World peoples, indigenous peoples, people of color, and other marked groups. Rather than perpetuate the nature/culture dualism, which imagines nature to be the inert ground for the exploits of Man, we must reconceptualize nature itself. Nature can no longer be imagined as a pliable resource for industrial production or social construction. Nature is agentic—it acts, and those actions have consequences for both the human and nonhuman world (Alaimo and Hekman, 2008, pp.4-5).

Feminist new materialisms, then, reassert the natural as more than ‘Nature’ but must also acknowledge the ecofeminist histories with which they might align. Within this special issue, Annette Gough and Hilary Whitehouse (2020) offer a deeper exploration of this point. In this way feminist new materialists including but by no means limited to the work of Karen Barad, Donna Haraway and Rosi Braidotti, have drawn on poststructuralist theory, posthuman theory

and developments in the biological and quantum sciences, to be at the forefront of critical discussion surrounding the nature of nature/culture debates and the return to ontological matters. Haraway has revolutionised feminist politics over decades with her various fabulated offerings of, for instance, the feminist cyborg, the modest witness, onco mouse, and situated knowledges. Within feminist new materialisms there is also/often a particular taking up of the combined work of 20th century continental philosophers, Gilles Deleuze and Felix Guattari, who over the course of 30 years of collaborative and solo work, developed a politically critical metaphysics of immanence to contrast with more prevailing transcendent metaphysics. Transcendent here implies the essential existence of categories or forms which transcend the mattered universe, whereas immanence implies no outside, essential essence or referent for being. Deleuze, for example, argues that transcendence is in immanence rather than in opposition to it. We would concur, as any ‘thought’ about transcendence is derived from the material, physical and so ‘of’ this world. Therefore, any transcendent and/or binary conceptions are firstly and always immanent. Transcendences exist, but only ever as a matter of immanence.

Within feminist new materialisms, as with Deleuze and Guattari, another key feature we might detect is the ways in which a posthuman understanding is proposed and propelled: knowledge/world production is neither anti-biological nor posited on biology as the master plan, dismissive of other philosophical perspectives (Ahmed 2008; Hinton & van der Tuin, 2014; Sullivan 2012). Rather, Taylor and Ivinson (2013) highlight how “‘new’ material feminisms displace the human as the principal ground for knowledge [...] and accepts that matter is alive’ (p. 666). Here ‘priority [is] given to difference, entanglement and undecidability’ as it confronts ‘the distance, separation and categorical assurance that shores up the self-mastery of the oedipal (male) subject of humanism’ (Maclure, 2015, p. 5).

In her book, *Posthuman Knowledge*, Rosi Braidotti (2019) posits that ‘the field of new materialism is especially strong in education in general and in feminist educational practices in particular’ where ‘the growth and high quality of this research field is so intense as to deserve a study of its own’ (2019, p.141). Indeed, the contemporary blossoming of attempts to prioritise the differences, entanglements and undecidability in *education*, Maclure (2015) attributes to feminist new materialisms. Other instances are documented in, *Feminist Posthumanisms, New Materialisms and Education*, edited by Ringrose, Warfield and Zarabadi (2020). The editors highlight how contributions to their collection represent a particular inflection: of the ‘PhEmaterialism’ movement, ‘where the *Ph* refers to posthuman, the *Fem* from feminisms, and

materialism from the new materialist movement’ (p.1, original emphasis). Such scholarship brings together ‘previously published work that [Ringrose, Warfield and Zarabadi] feel moves the field of educational research somewhere different than before’ (p.1). The *feminist* prefix to new materialisms is deployed here to encourage the material turn to perform *differently*. To borrow from Haraway, it is perhaps this difference that makes the difference, a difference that may be needed more acutely at this ecological precipice.

We also recognise that a healthy bibliography of feminist environmental education research continues to grow at a steady pace, challenging the normative dominance of gendered environmental binaries (for more on this, see the ever-expanding reference list on the *Environmental Education Intersectional Feminist Caucus* Facebook page, compiled by Connie Russell). And yet, beyond a series of special issues (for example, in *The Journal of Environmental Education*) this literature appears to have had little purchase within broader environmental education research discourses to date. Nonetheless, we see this literature as already ahead of the curve in considering any turn to the material within the social sciences (see, for instance, Gough and Whitehouse, 2020). Indeed, while this special issue is not specifically advocating feminist new materialisms, it most certainly embraces them and highlights their potential as one of many pedagogical possibilities that new materialisms can help explore and develop as an ethically orientated imperative within environmental education and its research.

Considering the need, then, for more equitably positioned epistemological engagements with human-environment assemblages, ‘environmental’ education and research is perhaps uniquely positioned to engage various playfully serious intentions and axiological possibilities of the material turn. In fact, this work is already well underway, as we now discuss.

New materialisms and Environmental Education

Developing and redeveloping materialist theories have already been identified as an emerging and important ‘route’ for environmental education (e.g. Howles, Reader, and Hodson, 2018). In *Environmental Education Research* for instance, Katrien Van Poeck, and Jonas Lysgaard consider the potentials for materially-informed theories to explore policy on environmental and sustainability education and their capacity to

challenge certain ideas and perspectives in philosophy of education, (social) constructivism and critical theory by revealing the need to move beyond an exclusive focus on discourse and language and to seriously take the materiality of context of sustainability debates into account (Van Poeck, and Lysgaard, 2016, p.313, emphasis in original).

Van Poeck and Lysgaard (2016, p.314) further articulate how, amongst other approaches, claims of new materialists to operate beyond the strictly discursive may “offer relevant and inspiring ideas, concepts, frameworks and findings to ESE policy research as well as the broader field of educational research.” Concurrently the new materialisms have been characterised as a new movement in thought for outdoor environmental education research (N. Gough, 2016) as well as a theoretical area that might hold potential for interrogating various ‘absences and silences’ within environmental education research (Payne, 2016). While we also note there has been a genealogical thread of engagement with poststructural and/or materialist thought in outdoor and environmental education from the preceding decades (e.g., Barrett, 2005; Bell and Russell, 2000; N. Gough, 1999; N. Gough and Price, 2004; Hart, 2005; McKenzie, 2005; Russell, 2005; Stables, 2007; Payne, 2005; Payne, 2019), as well as work that has drawn on the materialist philosophy of Deleuze and Guattari within environmental education specifically (e.g. Cole, 2019; N. Gough and Sellers, 2004; Stewart, 2008), that offer conversation partners for locating and historicising any contemporary ‘new’ turn to materiality in environmental education.

Examples of recent work in environmental education that reference authors we perceive as aligning themselves with new materialist theory include Pauliina Rautio (2014) and Karen Malone’s (2016) uptake of the agential realism of feminist new materialist Karen Barad in considering children’s geographies, Jonas Lysgaard and Kristoffer Fjeldsted’s (2015) examination of speculative realism and nature education ‘between discourse and matter’, and our own use of broad feminist new materialist, Deleuzo-Guattarian and animist literature to consider environmental education as materially immanent and ‘becoming’ (Clarke and Mcphie, 2014, 2016; and Mcphie and Clarke, 2015). Examples of creative engagements include Leesa Fawcett’s (2009) *Feral Sociality and (Un)Natural Histories* in which she thinks environmental education, salmon, and, among other things, earthworms rhizomatically to consider the (nomadic) ethical practice of environmental education scholarship. While Chessa Adsit-Morris’ (2017) book *Restorying Environmental Education*, in which she thinks with the

feminist new materialisms of Rosi Braidotti, Donna Haraway, and Karen Barad, is yet another example of new theory being put to work to reconfigure more contemporary approaches to environmental education.

Drawing further on Haraway, there are scholars articulating ‘common worlds’ approaches, particularly in research on education in the early years (e.g., Nxumalo and Pacini-Ketchabaw, 2017). Within this journal, for instance, we see Iris Duhn and Sarita Galvez’s (2020) creative exploration of Haraway’s notion of tentacularity to speculate on how children animate their relationality as an example of these. Further, within *Environmental Education Research*’s special issue on ‘Troubling the intersections of urban/nature/childhood in environmental education’, edited by Iris Duhn, Karen Malone, and Marek Tesar (2017), several articles explore concepts from common worlds ideas as well as new materialisms.

We also see commonalities being articulated between new materialist theory and Indigenous and decolonial approaches. As in the Land Education special issue of this journal, these have tended to focus on cultural perspectives, ontology and critiques of dominant ways of knowing and being, whilst acknowledging incommensurabilities which require attention and which we return to in our discussion at the end of this article (Tuck, McKenzie and McCoy, 2014; Tuck and McKenzie, 2015). Some recent attempts to integrate these perspectives within environmental and place education include work by Chris Beeman and Laura Sims (2020) and Elmarie Kotzé, Kathie Crocket and Cheri Waititi (2016). Furthering this attempt, Debbie Sonu and Nathan Snaza’s (2015, p.258) interrogation of ecological pedagogy with new materialisms suggests a need to engage in creative practice to ‘disrupt theories of vertical domination and conquest’ which may appear within environmental education practice-research.

Additionally, a series of environmental education authors have acknowledged the related field of non-representation theory (see Thrift, 2008), and a movement in anthropology to move to sociomaterial theory beyond nature/culture duality via a focus on ontology (spearheaded by, for example, Tim Ingold, 2000, 2007, 2011, 2013, 2015) as significant for environmental education research (e.g., Carolan, 2007; Gannon, 2015; Le Grange, 2018; Lynch & Mannion 2016; Rautio, 2013; Rooney, 2016; Ross & Mannion, 2012).

Lastly, we are aware of the diverse terminology in play in turns towards materiality and the particular move within educational discourse towards ‘sociomateriality’. Sociomateriality has been referenced in research works with a particular focus on the conception of place-based

environmental education (e.g. Mannion, Fenwick & Lynch, 2013; Nxumalo, 2016). While Marcia McKenzie and Andrew Bieler, for instance, offer a series of examples of educational place-oriented projects interpreted through a sociomaterial lens, drawing from many authors aligned with the new materialisms to argue that ‘categorizing some concerns as “social justice” or “critical” issues and others as “environmental” becomes increasingly untenable’ (McKenzie & Bieler, 2016, p.5).

There are, no doubt, important omissions in this brief survey and we acknowledge that some may perceive the new materialisms in much broader, or even narrower, terms than we do here. Nonetheless, we see this special issue as appealing to diverse approaches and terminology within the move to materiality in social science and are excited by the opportunities this diversity presents. Indeed, as we introduce the 17 papers that make up the special issue in the following article, we can see this diversity at work. We underscore too, that the contents of this special issue arise from an *open* call, and so the submissions do not necessarily respond to specific gaps or questions of the convergence of new materialisms of environmental education. Below we sketch out four themes that we think speak to this convergence and provide, perhaps, starting places for those concerned with furthering scholarship and practice development in these areas.

Tensions, knots, and lines of flight in new materialisms and environmental education: themes and directions of travel across and beyond the collection

The themes described below are not drawn directly from the articles in the special issue, but are rather areas we see as being of concern for environmental educators and researchers interested in the new materialisms. We see each theme as offering problems and directions for travel. These themes are: (1) new empiricism and post-qualitative inquiry; (2) the meeting of politics, ethics, and decolonial theory with new materialisms; (3) conceptions of nature, environment, sustainability and the human subject; and (4) new materialisms as environmental pedagogy. Below we lay out these problems, highlighting how some, including through reference to articles contained in the special issue, have responded to them.

1. New empiricism and the post-qualitative:

There is a particular move in the social sciences to consider the new materialisms as, at the very least, informing the manner in which we (re)think methodology. More forcefully there is an emerging movement that seeks to take new materialisms and the material-thinking they result in as a serious contestation to prevailing forms of qualitative methodology. Within the special issue, examples of these include Ruck and Mannion (2019), Jukes and Reeves (2019), and Crinall and Somerville (2019). Works that advocate this ‘post-method’ thinking include Law’s (2004) *After Method*, Coleman and Ringrose’s (2013) *Deleuze and Research Methodologies*, Jackson and Mazzei’s (2011) *Thinking with Theory*, Snaza and Weaver’s (2015) *Posthumanism and Educational Research*, Taylor and Hughes’ (2016) *Posthuman Research Practices in Education* and various special issues in the journals *Qualitative Inquiry* and *Cultural Studies ↔ Critical Methodologies*, which explore what Patti Lather and Elizabeth St. Pierre have referred to as the new empiricisms and/or post-qualitative research. Thomas and Bellingham’s (2020) edited collection, *Post-Qualitative Research and Innovative Methodologies* is another recent addition to this post-method movement.

Within the field of environmental education, edited collections interested in new theory, troubling/creating research methods concerned with materiality, place, the Anthropocene and environmental education practice have begun to appear (e.g. Somerville, Davies, Power, Gannon and de Cartet, 2011; Tuck and McKenzie; 2015; Reinertsen, 2016; Malone, Suon and Gray, 2017; Cole and Malone, 2019). Much of this work describes authors experimenting with or revisiting their own research, and we recognise in Noel Gough’s articulation that ‘it is much too soon to be making definitive, conclusive or prescriptive recommendations for practice’ (Gough, 2016, p.13), a reflection that applies to post-qualitative inquiry generally. Indeed, prescription is exactly what not to do, as the approach is about creating the new, which can never be prescribed (Massumi, 2010). However, conversations about the significance of new materialisms within environmental education research are well underway (e.g., Hart, Hart, Aguayo, and Thiemann, 2018; Mcphie and Clarke, 2019).

What, then, does research become for environmental education with a new materialism? New materialisms are informing environmental education research through approaches such as thinking with concepts (e.g., Hart, 2017), post autoethnography or immanent life writing (Clarke, 2019), cartographic and diffractive storytelling (Riley, 2019), engaging with the messy entanglements of theory/practice (Pleasants and Stewart, 2019) as well as through other myriad examples within and outside this special issue. We are interested in seeing work aligned with

environmental education but which take up the research issues appearing in these broad debates including the troubling of the human ‘subject’, ‘data’ and ‘analysis’ as well understood features of social research and praxis. Within this special issue we see authors take up these issues and provide further methodological innovation and provocation for environmental education research and practice development.

2. Politics, Ethics and Decolonial theory:

New materialist scholars often situate their work as in some way presenting directions forward for understanding and addressing broad environmental and social problems. How ethics is conceived, whether ‘environmental’ or otherwise, within new materialism is, however, not well explored in relation to the ethics of environmental education practice and research, nor necessarily the direction of movement implied, Cartesianly or otherwise framed. There are some meditations on modes and energies of directionality articulated within the special issue. Whilst Rousell (2018) makes the most obvious contribution to a discussion of ethics with his immanentist perspective, the ethical and political is alive within each article. Verlie and CCR15 (2018) further contribute with their application of intrasectionality, acting-with, and diffraction, which attune our attention to the constant flux and rearrangement of boundaries and hierarchies in attempts at posthuman practices of pedagogy and research. Even with the most critical offering, Affifi (2019) points to the importance of considering what our concepts do with the world, and how they come to matter. Experiments in the direction of concepts matterings are most forcefully endorsed by N. Gough and Adsit-Morris (2019), and Mcphie and Clarke (2018). However, there are many ethical issues still at play within the convergence of new materialism and environmental education, and cautionary voices have already begun to emerge. Where new materialist approaches have been taken up methodologically, Tuck and McKenzie (2015, p.17) note:

The increasing influence of Indigenous and decolonizing scholarship, spatial theories, and new materialism on theories, methodologies, and methods of social science cannot be disputed. However, although one might suppose that such innovations and recalibrations might prompt a more robust discussion of place in social sciences, this is not often the case. In many cases, flattened ontological or materialist frameworks de-

emphasize the agency of people and politics in attempting to better attend the interconnected “networks” or “mangles” of practice in researching social life.

Tuck and McKenzie (2015) point instead to Indigenous methodologies as seldom failing to account for issues of people, land, and place. Indeed, the vision of an ontological landscape where there is no distinction between one thing and the next, no fulcrum upon which to gain purchase in either tackling the problems of the world or, indeed, identifying what those problems are, will be of great concern to those who have worked so hard for decolonial social and environmental justice – and education. We see some reference to Indigenous people within the special issue, and yet we know more needs to be done to decolonise new materialisms.

Hinton, Mehrabi and Barla (2015, p.4) are particularly interested in this issue drawing as they do on Karen Barad’s agential realist materialism to ask ‘how might the concerns of postcolonial politics meet with a posthumanist emphasis on the non-human, and what might it mean to undertake postcolonial inquiry that takes the non-human as its point of departure?’. Further to this, Zoe Todd (2016) urges that Indigenous authors be cited more prominently and generously given their articulation of millenia old cosmologies which the new materialisms resonate with. For example, in academia there is an ongoing danger of misappropriating and anthropologising under-represented voices - speaking from a more privileged perspective *in place* of others - rather than listening more carefully to what those voices might be saying, and why. Perspectives which do just this have been forwarded in this journal, in a special issue on *Land education: Indigenous, postcolonial, and decolonizing perspectives on place and environmental education research*, edited by Eve Tuck, Marcia McKenzie & Kate McCoy (2014).

The recognition that academic endeavours that do not acknowledge and actively resist settler colonialism are implicitly invested in settler futurities (Tuck and Gaztambide-Fernández, 2013) must be taken seriously by new materialisms. This, combined with the issue that new materialisms itself may be seen as a majority white academic field located within privileged institutions (Hinton, Mehrabi and Barla, 2015) produce a cocktail of ethical issues around place/race/materialist theorising and praxis. For instance, a question of the basis of knowledge/matter generation must be considered both in terms of whether a conflict exists between prioritising new materialist/decolonial onto-epistemologies but also in terms of a critical understanding of how knowledge generated from within each onto-epistemology

matters the world in ‘ecological’, or colonial terms. Hinton, Mehrabi and Barla (2015, p. 13) demonstrate the potential iterative movement that may be required in this critical discussion:

we would ask whether it is possible to both acknowledge the importance of these critiques of new materialism, to say “yes” to their concerns, while also performing that doubled gesture of asking how new materialist onto-epistemologies might perform such erasures or elisions of race.

There are many seeming overlaps, such as distributed agencies among other-than-human things. Rosiek, Snyder and Pratt (2019) suggest that there has been ‘relatively little articulation’ between the two as yet, with perhaps the most voiceful criticism coming from Zoe Todd (2016) who suggests ontology is just another word for colonialism, or perhaps Eve Tuck’s (2014) aptly named paper, *A turn to where we already were?* These tensions must be acknowledged and the appropriate respect must be articulated within the theorising process itself, whilst the misappropriations must be identified and torn down, like the oppressive colonialist statues of historicised endeavours. This is a difficult task for many people due to the implicit nature of colonial bias. How can we know what we don’t know? To a certain degree, in academia at least, reflection and reflexivity were supposed to provide a suitable empathetic tool to counter this trend but new materialist scholars have found that these (often) self-referential concepts only produce ‘more of the same’ and so have had to trial new concepts with which to think with, such as ‘diffraction’ (see Haraway, 1997; and Barad, 2007), a term that you will see put to use in many new materialist inquiries, including in this special issue. So far, we think, diffraction seems to perform a little more equitably than reflections and reflexivities. Perhaps this is partially because it was designed for this specific purpose in the attempt to make life more tolerable, fair and healthy for those - humans and other-than-humans - with little power or privilege; the subaltern, or perhaps more appropriately, the minoritarian. Yet, many voices are still largely omitted from , or ignored within, academia, even though they may be written ‘about’, as if anthropologizing the Indigenous voice will somehow make amends.

What then, are the pedagogical ethics implicated in the new materialisms? Davies (2016, p.9) considers the genealogy of ethics in the new materialisms through Foucault, Butler, and Deleuze, and guides the reader through understanding how ethics is reconfigured in poststructuralism and specifically the new materialist thought of Karen Barad:

It is worth noting...that in none of these ways of making sense of the world, of our place in it, and our ethical obligations, whether that be poststructuralist or post-humanist new materialism, is ethics a matter of separate individuals following a set of rules. Ethical practice requires thinking beyond the already known, being open in the moment of the encounter, pausing at thresholds and crossing over (De Schauwer & Davies, 2015; Wyatt, 2014). Ethical practice is emergent in encounters with others, in emergent listening with others, including non-human others (Davies, 2014b). It is a matter of questioning what is being made to matter and how that mattering affects what it is possible to do and to think. Ethics is emergent in the intra-active encounters in which knowing, being and doing (epistemology, ontology and ethics) are inextricably entangled (Barad, 2007). (Davies, 2016, p.9)

This form of immanent ethics is not so much a form of guiding morality as an intra-relational knowing-becoming-doing (the use of hyphens here is to demonstrate the indissolubility of these acts). Within immanent materiality we are all already always in this mode, but our material conception of matter/s influence the manner in which we participate with the participation. The implication of this for environmental ethics and our modes of practicing research and pedagogy remain, perhaps perpetually, unclear. At the very least the forms of both humanist and environmental ethics that have developed in the postmodern era are not straightforwardly transposed to new materialist thinking (Johns-Putra, 2013). However, similar to the debate that raged over whether an anthropocentric or ecocentric ethic mattered as long as we got the job done, concerns over decolonialism, epistemology, accessibility, anthropocentricity, semantics, transcendent ethics and agential distribution, and so forth, need a response from the new materialisms to clarify issues of its performance (Todd, 2016). In a sense we see this as an area in which ‘critical’ environmental education may attempt to ‘give back’, and inform discourse with developing new materialist approaches which seek ethical practices.

3. *‘Nature’, ‘sustainability’, ‘the environment’ and ‘the subject undone’*

Along with questions raised by the meta-ethics of new materialisms come a number of concerns around ‘sustainability’ or ‘environmental care’. Within the special issue, Affifi (2019) infers the question: *What is to be sustained if the nature/culture boundary is blurred to an extent where we appreciate the vibrant materiality of the Great Pacific Garbage Patch as much as,*

say, a coral reef? Varying forms of this question are appearing in the literature and require an urgent response. For our part, we wonder if this kind of flattening might retain the notion of ethics as something outside of the world, rather than immanent to/of it. Immanent materialism includes ethics, which is lived and practiced in existence, rather than expunged from a flattened world. Our moral concerns are present, whether we like it or not. We *feel* when they are transgressed by thinking. Indeed, this process is much more like *thinking-feeling* in which the body ‘expands its repertory of dynamic postures by mixing, matching and alloying them, explores its own living potential, strikes new postures – invents new ways of affording itself of the world, in collaboration with the world, with what the world throws before it’ (Massumi, 2008, p.11). Indeed, Affifi (2019) articulates this very point, though through different language, and we agree that situatedness must be a core concern for environmental education researchers.

Traditionally the ‘flip-side’ to ‘the environment’ has been the human, the subject, or/and the individual who in some way is *the* source of agency that environmental education aims to reach. The picture no longer holds with a new materialist lens, where ‘no primacy of the human actor – individual or collective – over the nonhuman actor can be accepted on a priori grounds’ (Knappett & Malafouris, 2008, p. xi). Latour (1999) suggested agency ‘resides in the blind spot in which society and matter exchange properties’ (p. 190), yet society is itself matter-ed, and so agency can be thought of as co-constructed and distributed in time and space, regardless of the human actor - as the human actor is also a co-constructed multiplicity of other so-called actants – bacteria, virus, fungal mycelium, water, mites, plastic, and concepts (see Mcphie, 2018). This point is made particularly well within this special issue by Tammi (2019) with their exploration of how ‘mold-schools’ emerge as sites of interaction between practices and beings both human and other-than-human.

As Knappett and Malafouris (2008, pp. xi-xii) recognised, ‘agency need not be coterminous with intentionality, which releases nonhumans into the process of agency’. Even so, intentionality in humans is still contested (see Libet, 2006), especially if we exorcise the Cartesian ghost from such shells. Hofverberg (2019) demonstrates how intentionality may conceptually spill into and out of re-making practices with her paper in this special issue. Thus, perhaps agency might be(come) thought of as ‘a dance’ (Pickering, 2010), a ‘dance of animacy’ (Ingold, 2013) or just ‘living lines of environing’ (Mcphie and Clarke, 2018). Acknowledging a new materialist theoretical position, St. Pierre (2004) suggests educational research needs to

consider the potential for a ‘subject undone’, but it appears the repercussions of this thinking for environmental education remain under explored.

The immanent ethics of the material turn described by Davies (2016) and Rousell (2019), imply a letting go of both the ‘subject’ and the ‘environment’, when used in a categorical sense. We perceive the turn to materiality as in no way, or at least not necessarily or straightforwardly, a turn away from thinking ‘environmental’ problems, but rather an(other) understanding. As Donna Haraway (2014), referring to Marilyn Strathern, states; ‘it matters what stories tell stories. It matters what thoughts think thoughts. It matters what worlds world worlds’. Haraway (unpaginated) continues:

we need to take seriously the acquisition of that kind of skill, emotional, intellectual, material skill, to destabilise our own stories to retell them with other stories and vice versa. A kind of serious de-normalisation of that which is normally held still in order to do that which one thinks one is doing. It matters to destabilise worlds of thinking with other worlds of thinking. It matters to be less parochial, if ever there was a time to need to be worldly it is surely now.

In other words, within the special issue, we can see some of the ways in which both the ‘subject’ as learners and educators, as well as the ‘environment’ or ‘nature’, which may have been held too still within environmental education practice and research, might be thought differently, and how the various ethico-onto-epistemological (Barad, 2007) implications of the various new materialisms might *matter* in our work. However, doing this work is by no means straightforward.

When authors - many White, many globally northern, many middle-class - are applying new materialisms to environmental education, what exactly are they applying it *to*? Perhaps we could work our way back from current perceptions of romanticised White landscapes to a particular zeitgeist where the foundations of a privileged epistemological accessibility to so-called green scenery was formed in Europe. There are many references to how environmental framing first began to alter how privileged White Westerners optically distanced themselves from so-called scenic views of romanticised ‘natural’ landscapes (Antrop, 2013; Ellison, 2013; Ingold, 2000; Schama, 2004; Thompson, 2010), or the eco-fascistic origins of the modern environmental movement (Bookchin, 1987; Forchtner, 2019; Smyth, 2019; Staudenmaier, 2011). But there is not much on how this might manifest its White supremacist ideologies or

epistemological hierarchies ‘implicitly’ in the conceptual apparatus of contemporary environmental scholarship, including on environmental education. In keeping with the theme of this special issue, we’d like to further articulate how a particular ontology and therefore conception of ‘the environment’ might have huge ramifications for any new turn attempting to get past the barrier of privileged implicit Whiteness.

For example, along the inquiring path to this introduction we (White ... Westernised ... Male ...) wondered at the lingering impression in the burgeoning literature - across publications - that the concerns of environmental education should be for one certain group of things/phenomena rather than another group of things/phenomena. In some attempts to link environmental education and new materialist thinking, common things that are often exemplified as the object of concern remain distinctly ‘natural’, aligning themselves on one side of a divide they purport to circumvent and undermine (e.g. flora, fauna, water, outdoor spaces, etc). We hardly ever noticed examples of human-made phenomena being conceived as the thing to sustain or educate for/about. Certainly no thoughts or concepts (unless of course, we include the particular manmade concept of green/White ‘nature’). It seemed to us that those who wished to embrace new materialisms were trying really hard not to romanticise or bifurcate the world, but often fell back into the Cartesian trap by focusing purely on what they have been conditioned to think of as ‘natural’.

Indeed, we believe this is the most troublesome issue in thinking together environmental education and new materialisms, a potential barrier that prevents contemporary conceptual environmental rebellions from achieving their goals. If other perceptions of environments are omitted from thought, or other ontologies relegated to the sidelines of history by assuming what you are saying is ‘the’ truth as opposed to ‘a’ truth amongst others competing/converging/coalescing/diffracting... what potential futures disappear? We believe this White landscape ontology is implicitly institutionalised in much environmental scholarship by the very linguistic assumptions utilised. Even in employing a purportedly more equitable ontological turn, it seems almost too difficult for many scholars to weed out the implicit bias that has rooted itself into the very fabric of our lexicon and thought. However, time is of the essence - what, with the rise of the Far Right, the 6th Mass Extinction looming, along with climate catastrophe, pandemics, and the ethically obscure post/transhuman future we find ourselves in - perhaps we, at least some of us, need to explore every avenue, and push these

boundaries as far as they will stretch, by working harder to both imagine and understand how they never really existed in the first place?

4. *New materialisms as 'environmental' pedagogy*

Lastly there are a range of approaches that advocate the taking up of new materialist positions as potentially generative for educational practice. We recognise these follow a lineage of feminist, embodied, and situated approaches in broader educational practices as well as environmental education (see, e.g., Warren, 1990; Lather and Ellsworth, 1996; Bell and Russell, 2000; A. Gough, 2004; Le Grange, 2004; Fawcett, 2009). From outwith environmental education, Anna Hickey-Moody and Tara Page's (2016, p.12) edited collection offers perspectives of pedagogies of matter for political resistance in the arts, stating that:

bodies and the process of embodiment are core to our ways of knowing-being. However, they are also fundamental to the entanglement of *matter and learning and teaching (pedagogy)*. This embodied entanglement of matter and teaching as pedagogy - the moments when materials and spaces impact on bodies and bodies impact ideas - is our primary interest...through bodies and with matter, we are always making, performing and learning. Therefore we posit that new materialist pedagogy is embodied and is intra-action between bodies and matter.

This vision articulates an 'environmental education' in the broadest sense. Within the special issue we can find pedagogical experiments offered by Jukes and Ya Reeves (2019), Mannion, (2018), and Crinall and Sommerville (2019) too. However, in noting these examples we wish to stay aware of the potential of reifying a practice/theory divide, and instead want to remain open to the ways in which our readings, as bodily practices, seep through and confront our other bodily practices, and vice versa. Within this broad view, environmental educations are occurring constantly in the process of living.

New materialisms are also helping scholars reconsider pedagogy in ways that might resonate with environmental educators, particularly those accustomed to thinking with place and embodiment in their practices. And yet there is something decidedly (re)new(ed) about the scope of pedagogic discussions sweeping the social sciences. Pedagogy, irrespective of the environment as the originating concern, is being described as 'thingy' and slimy (Sojot, 2019) and as a process of placemaking, where the 'who' is entangled with the 'where' (Page, 2020). Geerts (2019, p.128) suggests that new materialist informed ideas can infer a 'pedagogy that is

centred on critique and creativity, situatedness, geopolitical (self-)awareness, accountability, and an immanent ethical attitude that takes current-day political constellations and complications into account'. Again, these descriptions appear outwith environmental education discourses. In these ways, new materialisms impel a pedagogy that is inherently critical, cautious, and environmental in the broadest sense of the term. The political potential of new materialist informed pedagogy is sketched particularly effectively by Juelskjær (2020, p.66) who concludes that:

In moving forward with feminist new materialist analyses of pedagogy...it would be fruitful to think about natureculture pedagogies of the sensorium and to begin to develop frameworks through which these pedagogies may be researched. Policy agendas that facilitate such research would also be welcomed, with a view to reversing climate change and building sustainable educational futures.

Irrespective of the warmth (or/and lack thereof) with which the new materialisms might be met by pedagogues and pedagogical scholars within environmental education, there is a sense in which the material, placeful, relational, situated, crisis aware, and ultimately environmental are no longer reserved for a small clique of scholars on the pages of this and related journals (as if they ever were). Rather, we wonder how might they come centre stage in the present and developing theoretical milieu of the social sciences and humanities and, indeed, education and pedagogy? There are questions about the extent to which this broadening engages with past philosophical debates within environmental ethics, philosophy and education. Nonetheless, environmental education, we would contend, has already become something quite other than it once was through this broadening. At the very least, new materialisms renew questions of what is actually going on when we are interacting with learners in the hope of expanding what is possible for 'practice'.

Present thoughts

Across new materialist discourses there is a recognition that key themes of the material, post-dualistic accounts, distributed agencies, and relational ontologies have been visited before, but also that this (re)turn may offer something new to our current and pressing predicaments in education. For instance, in their edited collection *Pedagogical Matters*, Snaza, Sonu, Truman and Zaliwska (2016, p.xxix) argue:

new materialisms gather together a range of ideas that have been taken up before, both in and outside of curriculum studies, but we think this gathering offers us a crucial chance to look at our practices as educators again, differently, more closely perhaps, as gesture toward the emergence of new political action.

Within the special issue we see example after example of how this new political action may be conceived in the present.

The present. Pandemic : lockdown/exposure; mass extinction : extinction rebellion; climate catastrophe : the youth climate movement; scandals of patriarchy : #MeToo; the rise of hate (again) : moments of empathy and rolling Black Lives Matter protests. Where and what is the remit of environmental education and research in such instances of the present? Should it, *can* it even, be severed from broader renderings of reality that feed and filter our daily lives, which themselves dictate what is environmental, what is *natural*, and what is not? Might these framings be altered so as to increase the plurality with which we can approach and understand ‘the problem’? Besides, are these creations, these concepts, not also environmental? Is this not the rejection of any advocacy for the ethical desert of the featureless plain, and rather a call to widen our understanding of methodologies as always already environmentally performative? As always already pedagogical in the way they condition our ways of being, regardless of their (non)paradigmatic allegiances – as always already political and ethical?

So, are the potential problems and solutions of environmental education research best articulated and tackled axiologically, ontologically, epistemologically, methodologically or by queer(y)ing the historicised concepts themselves? Language always seems to *get in the way*. Yet, as ‘language’ is just as real, ecological and *of* this world as, say, ‘experience’ - just as ‘theory’ is as physical as, say, ‘practice’ - then these (often conceived of as) ‘abstract’ phenomena will always *get in the way*. To continue our return to where we began, there is no outside to this path we travel to be able to pit one boundaried thing against another, such as nature and culture or mind and body. Abstraction remains immanent.

Put differently, if concepts perform ecologically (McPhie and Clarke, 2018), can we relearn, discover, invent, or put to use concepts to differently explore and challenge inequitable socio-ecologizing conditions - concepts that might diffract these/their stories and purposefully *get in the way* of less helpful extremes of thought/behaviour? These are hefty responsibilities for scholars of pedagogy. And why are we even writing about this stuff - in this way? Is it a futile

attempt to ‘make a difference’? Do we even have the agency to control or shape the direction of travel? Because, let’s face it, much of the new materialisms discourse appears too radical, inaccessible, incomprehensible or controversial even for some of the most acclaimed environmental academics, some of whom seem to have developed *new materialophobia*. As with any movement of thought there are, as ever, critics. Some scholars suggest new materialists and/or posthumanists contradict themselves by continuing to use the very dualisms they reject (James, 2017). This may be so in some cases, but just because a concept is critiqued doesn’t mean it cannot be used to effect, in the same way that if you never speak another dualism again it doesn’t mean you have erased them from the realms of thinking or behaviour. Regarding the problem of subjectification, Deleuze and Guattari (2004) suggested, ‘conversely, you can keep on saying “I,” just for kicks, and already be in another regime in which personal pronouns function only as fictions’ (p. 152). So, the key is not necessarily to reject dualisms, but to acknowledge the inherent problems with their performativities. Carry on using them if you wish, with the newly acquired knowledge of how they can perform inequitably if left unsupervised?

Critical consideration is essential in these ongoing movements as we grapple with the tumult created by fast moving theory (for example, Rodrigues, Payne, Le Grange, Carvalho, Steil, Lotz-Sisitka, & Linde-Loubser, 2020). However, one response to the *Call for Papers* for this special issue suggested that it read like ‘babble’. The term ‘babble’, with its onomatopoeic origins in child’s speech might be interpreted as derogatory. This is not an uncommon reaction, rather like the angry, defensive responses first encountered by the returned prisoner in the Plato’s Cave analogy. The description of new worlds to others yet to encounter them, or with those trying to make sense of them, invariably seems to require new and seemingly impenetrable terminology to the uninitiated, or critic. Further, the challenges to received ontologies can be seen as so counterintuitive as to seem ridiculous, or cause confusion and vexation. Nonetheless, from the perspective described within this introduction, we can understand the perception of something as ‘babble’ as always also materially performative, adding to the tumult of converging ways of thinking and to the changing nature of the topics at hand. Conservative approaches might hope to pull in one direction, maintain the current order of things, or look to the past for orientation. Yet to others, a future of this field is already upon and among us: the emergence of ‘critical, poststructural and post-qualitative-based new materialist, posthumanist, speculative ontologies and research practices has already changed EE and EE research’ (Hart and Hart, 2019, p.280). This special issue illustrates some of the

ways in which this is the case; and in reality, it may even prove a turning point? Put differently, perhaps as the contributors to this collection show in their various ways, it's in the *attempt* and in the ever-shifting *moments, movements and turns* where healthier trajectories may emerge, and travel. For *attempting* is also acting. So, let's attempt and adjust to the little changes that may be provoked, as we cautiously feel our way through a much needed, but not necessarily 'new', material turn in environmental education and its research.

References

- Adsit-Morris, C. (2017). *Restoring Environmental Education*. Palgrave Macmillan. London.
DOI: 10.1007/978-3-319-48796-0
- Affifi, R. (2019). Anthropocentrism's fluid binary. *Environmental Education Research*, 1-18.
DOI: 10.1080/13504622.2019.1707484
- Affifi, R., Blenkinsop, S., Humphreys, C., & Joldersma, C. W. (2017). Introduction to ecologizing philosophy of education. *Studies in Philosophy and Education*, 36(3), 229-241. DOI: 10.1007/s11217-017-9574-3
- Ahmed, S. (2008). Imaginary Prohibitions: Some Preliminary Remarks on the Founding Gestures of the 'New Materialism.' *European Journal of Women's Studies*, 15(1), 23-29. DOI: 10.1177/1350506807084854
- Alaimo, S. & Hekman, S. (2008). *Material feminisms*. Indiana University Press. Chicago.
- Anderson, B., & Wylie, J. (2009). On geography and materiality. *Environment and Planning A*, 41(2), 318–335. DOI: 10.1068/a3940
- Antrop, M. (2013). A Brief History of Landscape Research. In P. Howard, I. Thompson, & E. Waterton (Eds.), *The Routledge Companion to Landscape Studies* (pp. 12–22). London & New York: Routledge. DOI: 10.4324/9780203096925.ch1
- Applebaum, A. (2020). *Twilight of democracy: The seductive lure of authoritarianism*. London and New York: Penguin Random House.
- Barad, K. (2007). *Meeting The Universe Halfway: Quantum Physics and the Entanglement of matter and meaning*. Durham and London: Duke University Press. DOI: 10.1215/9780822388128
- Barrett, M. J. (2005). Making (Some) Sense of Feminist Poststructuralism in Environmental Education Research and Practice. *Canadian Journal of Environmental Education*, 10(1), 79-93.
- Beeman, C. & Sims, L. (2019). From relationship to something more: Environmental and sustainability education and a new ontological position. In D. Karrow & M.

- DiGuseppe (eds) *Environmental and Sustainability Education in Teacher Education* (pp. 193-208). Springer, Cham. DOI: 10.1007/978-3-030-25016-4_12
- Bell, A. C. & Russell, C. L. (2000). Beyond human, beyond words: Anthropocentrism, critical pedagogy, and the poststructuralist turn. *Canadian Journal of Education/Revue canadienne de l'education*, 25(3),188-203. DOI: 10.2307/1585953
- Bennett, J. (2010). *Vibrant Matter: a political ecology of things*. Durham and London: Duke University Press. DOI: 10.1215/9780822391623
- Bookchin, M. (1987). Social Ecology versus Deep Ecology: A Challenge for the Ecology Movement. *Green Perspectives: Newsletter of the Green Program Project*, 4–5. Retrieved from: <http://theanarchistlibrary.org/library/murray-bookchin-social-ecology-versus-deep-ecology-a-challenge-for-the-ecology-movement>
- Braidotti, R. (2019). *Posthuman knowledge*. New Jersey: John Wiley & Sons.
- Braun, B., & Whatmore, S. (Eds.). (2010). *Political matter: Technoscience, democracy and public life*. Minneapolis: University of Minnesota Press.
- Carolan, M. S. (2007). Introducing the concept of tactile space: creating lasting social and environmental commitments. *Geoforum*, 38(6), 1264-1275. DOI: 10.1016/j.geoforum.2007.03.013
- Carrington, D. (2020, August 17). Microplastic particles now discoverable in human organs. *The Guardian* newspaper. Retrieved from <https://www.theguardian.com/environment/2020/aug/17/microplastic-particles-discovered-in-human-organs>
- Clarke, D. A. G. (2017). Educating beyond the cultural and the natural: (re)framing the limits of the possible in environmental education. In: K. Malone, S. Truong, and T. Gray ed. (2017). *Reimagining Sustainability Education in Precarious Times* (pp. 305-319). Springer, London. DOI: 10.1007/978-981-10-2550-1_21
- Clarke, D. A. G. (2019). *Practising immanence:(still) becoming an environmental education academic*. Unpublished Doctoral Thesis. University of Edinburgh. Retrieved from: <https://era.ed.ac.uk/bitstream/handle/1842/35533/Clarke2019.pdf?sequence=1&isAllowed=y>

- Clarke, D. A. G., & Mcphie, J. (2014). Becoming animate in education: immanent materiality and outdoor learning for sustainability. *Journal of Adventure Education & Outdoor Learning*, 14(3), 198-216. DOI: 10.1080/14729679.2014.919866
- Clarke, D. A. G., & Mcphie, J. (2016). From places to paths: Learning for Sustainability, teacher education and a philosophy of becoming. *Environmental Education Research*, 22(7), 1002-1024. DOI: 10.1080/13504622.2015.1057554
- Cole, D. R. (2019). The Designation of a Deleuzian Philosophy for Environmental Education and Its Consequences.... *Australian Journal of Environmental Education*, 35(3), 173-182. DOI: 10.1017/aee.2019.16
- Cole, D. R., & Malone, K. (2019). Environmental education and philosophy in the Anthropocene. *Australian Journal of Environmental Education*, 35(3), 157-162. DOI: 10.1017/aee.2020.5
- Coleman, R., & Ringrose, J. (Eds.). (2013). *Deleuze and research methodologies*. Edinburgh: Edinburgh University Press.
- Connolly, W. E. (2013). The 'new materialism' and the fragility of things. *Millennium-Journal of International Studies*, 41(3), 399-412. DOI: 10.1177/0305829813486849
- Coole, D., & Frost, S. (Eds.). (2010). *New materialisms*. Durham and London: Duke University Press Books. DOI: 10.1215/9780822392996
- Crinall, S. (2019). *Sustaining Childhood Natures: The Art of Becoming with Water*. Singapore: Springer. DOI: 10.1007/978-981-13-3007-0
- Crinall, S., & Somerville, M. (2019). Informal environmental learning: the sustaining nature of daily child/water/dirt relations. *Environmental Education Research*, 1-12. DOI: 10.1080/13504622.2019.1577953
- Cutter-Mackenzie-Knowles, A., Malone, K. & Barratt Hacking, E. (Eds.) (2020). *Research Handbook on Childhoodnature: Assemblages of Childhood and Nature Research*. Singapore: Springer. DOI: 10.1007/978-3-319-51949-4
- Davies, B. (2016). Ethics and the new materialism: a brief genealogy of the 'post'philosophies in the social sciences. *Discourse: Studies in the Cultural Politics of Education*, 39(1), 113-127. DOI: 10.1080/01596306.2016.1234682

- Deleuze, G., & Guattari, F. (2004). *A Thousand Plateaus*. London: Bloomsbury.
- Deloria, V. (1999). *Spirit and reason: The Vine Deloria, Jr., reader*. Golden, CO: Fulcrum.
- Diaz-Diaz, C. & Semenec, P. (2020). *Posthumanist and New Materialist Methodologies: Research After the Child*. Singapore: Springer. DOI: 10.1007/978-981-15-2708-1
- Duff, C. (2014). *Assemblages of Health: Deleuze's Empiricism and the Ethology of Life*. Dordrecht Heidelberg, New York & London: Springer. DOI: 10.1007/978-94-017-8893-9
- Duhn, I., & Galvez, S. (2020). Doing curious research to cultivate tentacular becomings. *Environmental Education Research*, 26(5), 731-741. DOI: 10.1080/13504622.2020.1748176
- Duhn, I., Malone, K., & Tesar, M. (2017). Troubling the intersections of urban/nature/childhood in environmental education, *Environmental Education Research*, 23(10), 1357-1368, DOI: 10.1080/13504622.2017.1390884
- Ellison, A. M. (2013). The Suffocating Embrace of Landscape and the Picturesque Conditioning of Ecology. *Landscape Journal*, 32(1), 79–94. DOI: 10.3368/lj.32.1.79
- Fawcett, L. (2009). Feral sociality and (un)natural histories. On nomadic ethics and embodied learning. In M. McKenzie, P. Hart, H. Bai, & B. Jickling (Eds.), *Fields of green. Restorying culture, environment, and education* (pp. 227–236). Cresskill, NJ: Hampton Press.
- Forchtner, B. (ed.) (2019). *The Far Right and the Environment: Politics, Discourse and Communication*. London: Routledge.
- Forman, P. J. (2020). 'Materiality, New Materialisms' In: Kobayashi, A. (Ed.) *International Encyclopaedia of Human Geography* (Second Edition) Available online: <https://www.sciencedirect.com/referencework/9780081022962/international-encyclopedia-of-human-geography#book-description>
- Fox, N. J. (2016). Health sociology from post-structuralism to the new materialisms. *Health* 20(1), 62-74. DOI: 10.1177/1363459315615393

- Fox, N. J. & Alldred, P. (2014). New materialist social inquiry: designs, methods and the research-assemblage. *International Journal of Social Research Methodology*, 18(4), 399-414. DOI: 10.1080/13645579.2014.921458
- Frost, S. (2011). The Implications of the New Materialisms for Feminist Epistemology. In H. E. Grasswick (ed.), *Feminist Epistemology and Philosophy of Science: Power in Knowledge*, pp. 69-83. Dordrecht, Heidelberg, London & New York: Springer. DOI: 10.1007/978-1-4020-6835-5
- Gamez-Djokic, M., & Waytz, A. (2020). Concerns About Automation and Negative Sentiment Toward Immigration. *Psychological Science*, 31(8), 987-1000. DOI: 10.1177/0956797620929977.
- Gannon, S. (2015). Saving squawk? Animal and human entanglement at the edge of the lagoon. *Environmental Education Research*, 23(1), 91-110. DOI: 10.1080/13504622.2015.1101752
- Garlick, S. (2019). The return of nature: Feminism, hegemonic masculinities, and new materialisms. *Men and Masculinities*, 22(2), 380-403. DOI: 10.1177/1097184X17725128
- Geerts, E. (2019). Re-vitalizing the American Feminist-Philosophical Classroom: Transformative Academic Experimentations with Diffractive Pedagogies. In *Posthumanism and Higher Education* (pp. 123-140). Palgrave Macmillan, Cham. DOI: 10.1007/978-3-030-14672-6_7
- Gessen, M. (2020). *Surviving autocracy*. New York: Penguin Random House.
- Gough, A. (2004). Blurring boundaries: embodying cyborg subjectivity and methodology. In H Piper. and I Stronach. (ed.), *Educational research: Difference and diversity*, (pp. 113–127). Farnham: Ashgate.
- Gough, A., & Whitehouse, H. (2020). Challenging amnesias: re-collecting feminist new materialism/ecofeminism/climate/education. *Environmental Education Research*, 1-15. DOI: 10.1080/13504622.2020.1727858

- Gough, N. and Sellers, W. (2004) Re/de/signing the world: poststructuralism, deconstruction and 'reality' in outdoor environmental education research. Paper presented at 'Connections and Disconnections: Examining the Reality and Rhetoric', International Outdoor Education Research Conference. July 6–9. Bendigo, Victoria: La Trobe University.
- Gough, N. (1999). Rethinking the subject:(de) constructing human agency in environmental education research. *Environmental Education Research*, 5(1), 35-48. DOI: 10.1080/1350462990050102
- Gough, N. (2016). Postparadigmatic materialisms: A “new movement of thought” for outdoor environmental education research? *Journal of Outdoor and Environmental Education*, 19(2), 51-65. DOI: 10.1007/BF03400994
- Gough, N. & Price, L. (2004). Rewording the world: poststructuralism, deconstruction and the 'real' in environmental education. *Southern African Journal of Environmental Education*, 21, 23-36.
- Gough, N., & Adsit-Morris, C. (2019). Words (are) matter: generating material-semiotic lines of flight in environmental education research assemblages (with a little help from SF). *Environmental Education Research*, 1-18. DOI: 10.1080/13504622.2019.1663793
- Haraway (2014) *Anthropocene, Capitalocene, Chthulucene: Staying with the Trouble*. Retrieved from: <https://vimeo.com/97663518>
- Haraway, D. J. (1997). Modest_Witness@Second_Millennium.FemaleMan_Meets_OncoMouse: *Feminism and Technoscience*. New York: Routledge.
- Hart, C. (2017). En-gendering the material in environmental education research: Reassembling otherwise. *The Journal of Environmental Education*, 48(1), 46-55. DOI: 10.1080/00958964.2016.1249328
- Hart, P. (2005). Transitions in thought and practice: links, divergences and contradictions in post-critical inquiry, *Environmental Education Research*, 11(4), 391-400. DOI: 10.1080/13504620500169270

- Hart, P., & Hart, C. (2019). Changing mindsets: Becoming planetary. *The Journal of Environmental Education*, 50(4-6), 270-288. DOI: 10.1080/00958964.2019.1687410
- Hart, P., Hart, C., Aguayo, C., & Thiemann, F. T. (2018). Theoretical and methodological trends in environmental education research. *Pesquisa em Educação Ambiental*, 13, 75-92. DOI: 10.18675/2177-580X.vol13.Especial.p75-91
- Harvey, G. (Ed.). (2013). *The handbook of contemporary animism*. Handbooks on Contemporary Religion. Durham, NC: Acumen Publishing. DOI: 10.4324/9781315728964
- Hattenstone, S. (2020, 8 August). 'The virus piggybacked on racism': why did Covid-19 hit BAME families so hard? Guardian Newspaper, Retrieved from <https://www.theguardian.com/world/2020/aug/08/the-virus-piggybacked-on-racism-why-did-covid-19-hit-bame-families-so-hard>
- Hickey-Moody, A., & Page, T. (2016). *Arts, pedagogy and cultural resistance: New materialisms*. London: Rowman & Littlefield International
- Hinton, P., Mehrabi, T., & Barla, J. (2015) *New materialisms/New colonialisms*. Retrieved from: https://www.academia.edu/37684644/New_materialisms_New_colonialisms_2015_
- Hinton, P. & van der Tuin, I. (2014). 'Preface'. *Women: A Cultural Review*, 25(1): 1-8. DOI: 10.1080/09574042.2014.903781
- Hofverberg, H. (2019). Entangled threads and crafted meanings—students' learning for sustainability in remake activities. *Environmental Education Research*, 1-13. DOI: 10.1080/13504622.2019.1664414
- Howles, T., Reader, J., & Hodson, M. J. (2018). 'Creating an Ecological Citizenship': Philosophical and Theological Perspectives on The Role of Contemporary Environmental Education. *The Heythrop Journal*, 59(6), 997-1008. DOI: 10.1111/heyj.13015
- Ingold, T. (2000). *The perception of the environment: essays on livelihood, dwelling and skill*. London: Routledge. DOI: 10.4324/9780203466025

- Ingold, T. (2007). *Lines: a brief history*. Oxford: Routledge. DOI: 10.4324/9780203961155
- Ingold, T. (2011). *Being alive: Essays on movement, knowledge and description*. Oxford: Routledge. DOI: 10.4324/9780203818336
- Ingold, T. (2013). *Making: Anthropology, Archaeology, Art and Architecture*. Oxford: Routledge. DOI: 10.4324/9780203559055
- Ingold, T. (2015). *The life of lines*. Oxford: Routledge. DOI: 10.4324/9781315727240
- Jackson, A. Y., & Mazzei, L. A. (2011). *Thinking with theory in qualitative research: Viewing data across multiple perspectives*. London: Routledge. DOI: 10.4324/9780203148037
- James, P. (2017). Alternative paradigms for sustainability: Decentering the human without becoming posthuman. In K. Malone, S Truong, and T. Gray (Eds.) *Reimagining sustainability in precarious times* (pp. 29-44). Singapore: Springer. DOI: 10.1007/978-981-10-2550-1_3
- Johns-Putra, A. (2013). Environmental care ethics: notes toward a new materialist critique. *Symploke*, 21(1), 125-135. DOI: 10.5250/symploke.21.1-2.0125
- Juelskjær, M. (2020). Mattering pedagogy in precarious times of (un) learning. *Matter: Journal of New Materialist Research*, 1(1), 52-79. Retrieved from: <https://revistes.ub.edu/index.php/matter/article/view/30067>
- Jukes, S., & Reeves, Y. (2019). More-than-human stories: experimental co-productions in outdoor environmental education pedagogy. *Environmental Education Research*, 1-19. DOI: 10.1080/13504622.2019.1699027
- Knappett, C. & Malafouris, L. (2008) Material and Nonhuman Agency: An Introduction. In C. Knappett and L. Malafouris (Eds.) *Material Agency: Towards a Non-Anthropocentric Approach*, pp. ix-xix. New York: Springer. DOI: 10.1007/978-0-387-74711-8

- Kotzé, E., Crocket, K., & Waititi, C. (2016). Meeting the Wharenui Shapes Teaching/Learning Therapy: Place Pedagogy, New Materialism, and Whakaaro Māori. *Australian and New Zealand Journal of Family Therapy*, 37(3), 317-326. DOI: 10.1002/anzf.1172
- Lather, P. & Ellsworth, E. (1996). This issue: Situated pedagogies—Classroom practices in postmodern times. *Theory into Practice*. 35(2), 70-71. DOI: 10.1080/00405849609543704
- Latour, B. (1999) *Pandora's Hope: Essays on the Reality of Science Studies*. Cambridge, MA: Harvard University Press.
- Latour, B. (2004). *Politics of nature*. Cambridge: Cambridge University Press.
- Latour, B. (2005). *Reassembling the social*. Oxford: Oxford University Press.
- Latour, B., & Woolgar, S. (1979). *Laboratory Life: The Construction of Scientific Facts*. Princeton, NJ: Princeton University Press.
- Law, J. (2004). *After method: Mess in social science research*. London: Routledge. DOI: 10.4324/9780203481141
- Le Grange, L. (2004). Embodiment, social praxis and environmental education: some thoughts. *Environmental Education Research*, 10(3), 387-399. DOI: 10.1080/1350462042000258206
- Le Grange, L. (2018). Spinoza, deep ecology and education informed by a (post) human sensibility. *Educational Philosophy and Theory*, 50(9), 878-887. DOI: 10.1080/00131857.2017.1384723
- Le Grange, L. (2019). The Anthropocene: Becoming-imperceptible of (environmental) education. *On Education: Journal for Research and Debate*, 2(4), 1-6. DOI: 10.17899/on_ed.2019.4.4
- Libet, B. (2006). Reflections on the interaction of the mind and brain. *Progress in Neurobiology*, 78, 322-326. DOI: 10.1016/j.pneurobio.2006.02.003.

- Lundborg, T., & Vaughan-Williams, N. (2015). New materialisms, discourse analysis, and international relations: A radical intertextual approach. *Review of International Studies*, 41(1), 3. DOI: 10.1017/S0260210514000163
- Lynch, J., & Mannion, G. (2016). Enacting a place-responsive research methodology: walking interviews with educators. *Journal of Adventure Education and Outdoor Learning*, 16(4), 330-345. DOI: 10.1080/14729679.2016.1163271
- Lysgaard, J.A. and Fjeldsted, K.L (2015). Education between discourse and matter. In: P. Kemp (Ed.) *Nature in Education*. Zürich: LIT Verlag.
- MacFarlane, J. M. (2020). *Transhumanism as a New Social Movement: The Techno-Centred Imagination*. Cham, Switzerland: Palgrave Macmillan DOI: 10.1007/978-3-030-40090-3
- Maclure, M. (2015). The ‘new materialisms’: a thorn in the flesh of critical qualitative inquiry? In G. Cannella, M.S. Perez & P. Pasque (eds.) *Critical Qualitative Inquiry: Foundations and Futures*. Walnut Creek, California: Left Coast Press.
- Malone, K. (2016). Theorizing a child–dog encounter in the slums of La Paz using post-humanistic approaches in order to disrupt universalisms in current ‘child in nature’ debates. *Children's Geographies*, 14(4), 390-407. DOI: 10.1080/14733285.2015.1077369
- Malone, K., Tesar, M. & Arndt, S. (2020). *Theorising Posthuman Childhood Studies*. Singapore: Springer. DOI: 10.1007/978-981-15-8175-5
- Malone, K., Truong, S., & Gray, T. (2017). *Reimagining Sustainability in Precarious Times*. Singapore: Springer. DOI: 10.1007/978-981-10-2550-1
- Mannion, G. (2019). Re-assembling environmental and sustainability education: orientations from new materialism. *Environmental Education Research*, 1-20. DOI: 10.1080/13504622.2018.1536926
- Mannion, G., Fenwick, A., & Lynch, J. (2013). Place-responsive pedagogy: Learning from teachers’ experiences of excursions in nature. *Environmental Education Research*, 19(6), 792-809. DOI: 10.1080/13504622.2012.749980

- Massumi, B. (2008). The thinking-feeling of what happens: A semblance of a conversation. *Inflexions*, 1, 1-40. Retrieved from: http://inflexions.org/n1_The-Thinking-Feeling-of-What-Happens-by-Brian-Massumi.pdf
- Massumi, B. (2010). What concepts do: Preface to the Chinese translation of a thousand plateaus. *Deleuze Studies*, 4(1), 1-15. DOI: 10.3366/e1750224110000772
- McKenzie, M. (2005). The ‘post-post period’ and environmental education research. *Environmental Education Research*, 11(4), 401-412. DOI: 10.1080/13504620500169361
- McKenzie, M., & Bieler, A. (2016). *Critical education and sociomaterial practice: Narration, place, and the social*. New York: Peter Lang. DOI: 10.3726/978-1-4539-1715-2
- McLeod, K. (2017). *Wellbeing Machine: How Health Emerges from the Assemblages of Everyday Life*. Durham, North Carolina: Carolina Academic Press.
- Mcphie, J. (2017). *The Accidental Death of Mr. Happy: A Post-Qualitative Rhizoanalysis of Mental Health and Wellbeing*. Unpublished Doctoral thesis. Lancaster University.
- Mcphie, J. (2018). I knock at the stone’s front door: Performative pedagogies beyond the human story. *Parallax*, 24(3), 306-323. DOI: 10.1080/13534645.2018.1496581
- Mcphie, J. (2019). *Mental Health and Wellbeing in the Anthropocene: A Posthuman Inquiry*. Basingstoke, UK: Palgrave Macmillan. DOI: 10.1007/978-981-13-3326-2
- Mcphie, J., & Clarke, D. A. G. (2015). A Walk in the Park: Considering Practice for Outdoor Environmental Education Through an Immanent Take on the Material Turn. *The Journal of Environmental Education*, 46(4), 230-250. DOI: 10.1080/00958964.2015.1069250
- Mcphie, J., & Clarke, D. A. G. (2018). Nature matters: diffracting a keystone concept of environmental education research—just for kicks. *Environmental Education Research*, 1-18. DOI: 10.1080/13504622.2018.1531387
- Mcphie, J., & Clarke, D. A. G. (2019). Post-qualitative inquiry in outdoor studies. In B. Humberstone and H. Prince (Eds) *Research Methods in Outdoor Studies* (pp.186-195). London: Routledge. DOI: 10.4324/9780429199004-18

- Merewether, J. (2019). New materialisms and children's outdoor environments: Murmurative diffractions. *Children's Geographies*, 17(1), 105-117. DOI: 10.1080/14733285.2018.1471449
- Mol, A. (2002). *The body multiple*. Durham, NC: Duke University Press. DOI: 10.1215/9780822384151
- Murdoch, J. (2001) Ecologising Sociology: Actor-Network Theory, Co-Construction and the Problem of Human Exemptionalism. *Sociology*, 35(1), 111-133. DOI: 10.1177/0038038501035001008
- Myers, C. Y. (2019). *Children and Materialities: The Force of the More-than-human in Children's Classroom Lives*. Singapore: Springer. DOI: 10.1007/978-981-13-8168-3
- Nxumalo, F. (2016). Touching place in childhood studies: Situated encounters with a community garden. In H. Skott-Myhre, V. Pacini-Ketchabaw & K. Skott-Myhre (Eds) *Youth Work, Early Education, and Psychology* (pp. 131-158). New York: Palgrave Macmillan. DOI: 10.1057/9781137480040_8
- Nxumalo, F., & Pacini-Ketchabaw, V. (2017). 'Staying with the trouble' in child-insect-educator common worlds. *Environmental Education Research*, 23(10), 1414-1426. DOI: 10.1080/13504622.2017.1325447
- Page, T. (2020). *Placemaking. A new materialist theory of pedagogy*. Edinburgh: Edinburgh University Press. DOI: 10.3366/j.ctv1453k6t
- Payne, P. (2005) Lifeworld and textualism: reassembling the researcher/ed and 'others', *Environmental Education Research*, 11(4), 413-431, DOI: 10.1080/13504620500169411
- Payne, P. (2016). What next? Post-critical materialisms in environmental education. *The Journal of Environmental Education*, 47(2), 169-178. DOI: 10.1080/00958964.2015.1127201
- Payne, P. (2019). Performative abstractionism in environmental education: A critical theory of theory. *Journal of Environmental Education*. 50(4-6), 289-320. DOI 10.1080/00958964.2019.1687405

- Pickering, A. (2010). Material culture and the dance of agency. In D. Hicks & M. C. Beaudry (Eds.), *The Oxford Handbook of Material Culture Studies*, pp. 191– 208. Oxford: Oxford University Press. DOI: 10.1093/oxfordhb/9780199218714.013.0007
- Pleasants, K., & Stewart, A. (2019). Entangled Philosophical And Methodological Dimensions Of Research In Outdoor Studies? *Research Methods in Outdoor Studies*. London: Routledge. DOI: 10.4324/9780429199004-2
- Preston, C. J. (2017). *From Atom to Atmosphere*. Blog. Retrieved from <https://plastocene.com/2017/08/18/from-atom-to-atmosphere/>
- Rautio, P. (2013). Children who carry stones in their pockets: On autotelic material practices in everyday life. *Children's Geographies*, 11(4), 394-408. DOI: 10.1080/14733285.2013.812278
- Rautio, P. (2014). Mingling and imitating in producing spaces for knowing and being: Insights from a Finnish study of child–matter intra-action. *Childhood*, 21(4), 461-474. DOI: 10.1177/0907568213496653
- Rautio, P. & Stenvall, E. (2019). *Social, Material and Political Constructs of Arctic Childhoods: An Everyday Life Perspective*. Singapore: Springer. DOI: 10.1007/978-981-13-3161-9
- Reinertsen, A. (Ed.). (2016). *Becoming Earth: A Post Human Turn in Educational Discourse Collapsing Nature/Culture Divides*. Singapore: Springer. DOI: 10.1007/978-94-6300-429-9
- Riley, K. (2019). *(Re) storying human/nonhuman relationships: Posthumanist possibilities in researcher/teacher/environmental education worlds*. Unpublished Doctoral Thesis. Deakin University.
- Ringrose, J., Warfield, K., & Zarabadi, S. (Eds.). (2020). *Feminist posthumanisms, new materialisms and education*. Abingdon, UK and New York: Routledge. DOI: 10.4324/9781351186674
- Rodrigues, C., Payne, P. G., Grange, L. L., Carvalho, I. C., Steil, C. A., Lotz-Sisitka, H., & Linde-Loubser, H. (2020). Introduction: “New” theory, “post” North-South

- representations, praxis. *The Journal of Environmental Education*, 51(2), 97-112. DOI: 10.1080/00958964.2020.1726265
- Rooney, T. (2016). Weather worlding: learning with the elements in early childhood. *Environmental Education Research*, 1(24), 1-12. DOI: 10.1080/13504622.2016.1217398
- Rosiek, J. L., Snyder, J. and Pratt, S. L. (2019). The New Materialisms and Indigenous Theories of Non-Human Agency: Making the Case for Respectful Anti-Colonial Engagement. *Qualitative Inquiry*, 26(3-4), 331-346. DOI: 10.1177/1077800419830135
- Ross, H., & Mannion, G. (2012). Curriculum making as the enactment of dwelling in places. *Studies in Philosophy and Education*, 31(3), 303-313. DOI: 10.1007/s11217-012-9295-6
- Rousell, D. (2018). Doing little justices: Speculative propositions for an immanent environmental ethics. *Environmental Education Research*, 1-15. DOI: 10.1080/13504622.2018.1517408
- Ruck, A., & Mannion, G. (2019). Fieldnotes and situational analysis in environmental education research: experiments in new materialism. *Environmental Education Research*, 1-18. DOI: 10.1080/13504622.2019.1594172
- Russell, C. (2005) 'Whoever does not write is written': the role of 'nature' in post-post approaches to environmental education research, *Environmental Education Research*, 11(4), 433-443, DOI: 10.1080/13504620500169569
- Schama, S. (2004). *Landscape and Memory*. London: Harper Perennial.
- Schneider, R. (2015). New materialisms and performance studies. *TDR/The Drama Review*, 59(4), 7-17. DOI: 10.1162/DRAM_a_00493
- Smith, J. L. (2017). I, River? New materialism, riparian nonhuman agency and the scale of democratic reform. *Asia Pacific Viewpoint*, 58(1), 99-111. DOI: 10.1111/apv.12140
- Smyth, R (2019, April 3). Nature writing's fascist roots. *New Statesman*. Retrieved from: <https://www.newstatesman.com/culture/books/2019/04/eco-facism-nature-writing-nazi-far-right-nostalgia-england>

- Snaza, N., & Weaver, J. (2014). *Posthumanism and educational research*. Abingdon, UK and New York: Routledge. DOI: 10.4324/9781315769165
- Snaza, N., Sonu, D., Truman, S. E., & Zaliwska, Z. (2016). *Pedagogical matters: New materialisms and curriculum studies*. New York: Peter Lang Publishing, Inc. DOI: 10.3726/978-1-4539-1648-3
- Sojot, A. N. (2019). Slimer, Slime, and the Thingness of Pedagogy. *Educational Perspectives*, 51(1), 8-12.
- Somerville, M., Davies, B., Power, K., Gannon, S., & de Carteret, P. (2012). *Place pedagogy change*. Rotterdam: Sense. DOI: 10.1007/978-94-6091-615-1
- Sonu, D., & Snaza, N. (2015). The Fragility of Ecological Pedagogy: Elementary Social Studies Standards and Possibilities of New Materialism. *Journal of Curriculum and Pedagogy*, 12(3), 258-277. DOI: 10.1080/15505170.2015.1103671
- St. Pierre, E. A. (2004). Deleuzian concepts for education: The subject undone. *Educational Philosophy and Theory*, 36(3), 283-296. DOI: 10.1111/j.1469-5812.2004.00068.x
- St. Pierre, E. A. (2014). A brief and personal history of post qualitative research: Toward “post inquiry”. *Journal of curriculum theorizing*, 30(2), 2-19. Retrieved from: <https://journal.jctonline.org/index.php/jct/article/view/521>
- St. Pierre, E. A. (2015). Practices for the “new” in the new empiricisms, the new materialisms, and post qualitative inquiry. In N. Denzin and M. Giardina (Eds) *Qualitative inquiry and the politics of research*, pp. 75-96. London and New York: Routledge.
- Stables, A. (2007). Is Nature Immaterial? The Possibilities for Environmental Education without an Environment. *Canadian Journal of Environmental Education*, 12(1), 55-67.
- Staudenmaier, P. (2011). “Fascist Ecology: The "Green Wing" of the Nazi Party and its Historical Antecedents”, in J. Biehl and P. Staudenmaier (eds.) *Ecofascism Revisited: Lessons from the German Experience*, pp. 13-42. Porsgrunn: New Compass Press.

- Stewart, A. (2008). Whose place, whose history? Outdoor environmental education pedagogy as 'reading' the landscape. *Journal of Adventure Education & Outdoor Learning*, 8(2), 79-98. DOI: 10.1080/14729670801906125
- Sullivan, N. (2012). The Somatechnics of Perception and the Matter of the Non/Human: A Critical Response to the New Materialism. *European Journal of Women's Studies*, 19(3), 299-313. DOI: 10.1177/1350506812443477
- Tammi, T. (2019). What if schools were lively more-than-human agencements all along? Troubling environmental education with moldschools. *Environmental Education Research*, 1-16. DOI: 10.1080/13504622.2019.1584881
- Taylor, C. A., & Hughes, C. (Eds.). (2016). *Posthuman Research Practices in Education*. Basingstoke, UK and New York: Palgrave Macmillan. DOI: 10.1057/9781137453082
- Taylor, C. A. & Ivinson, G. (2013). Material feminisms: new directions for education. *Gender and Education*, 25(6), 665-670. DOI: 10.1080/09540253.2013.834617
- Thomas, M., & Bellingham, R. (2020). *Post-qualitative research and innovative methodologies*. New York and London: Bloomsbury. DOI: 10.5040/9781350062078
- Thompson, I. (2010). *The English Lakes: A History*. London, New York & Berlin: Bloomsbury.
- Thorpe, H., & Clark, M. (2020). Gut feminism, new materialisms and sportwomen's embodied health: The case of RED-S in endurance athletes. *Qualitative Research in Sport, Exercise and Health*, 12(1), 1-17. DOI: 10.1080/2159676X.2019.1631879
- Thrift, N. (2008). *Non-representational theory: Space, politics, affect*. London: Routledge. DOI: 10.4324/9780203946565
- Todd, Z. 2016. An indigenous feminist's take on the ontological turn: 'ontology' is just another word for colonialism. *Journal of Historical Sociology* 29(1), 4-22. DOI:10.1111/johs.12124
- Tuck, E. (2014, April). *A turn to where we already were? Settler inquiry, indigenous philosophy, and the ontological turn*. Paper presented to the Annual Meeting of the American Educational Research Association, Philadelphia, PA.

- Tuck, E., & Gaztambide-Fernández, R. A. (2013). Curriculum, replacement, and settler futurity. *Journal of Curriculum Theorizing*, 29(1), 72-89. Retrieved from: <https://journal.jctonline.org/index.php/jct/article/viewFile/411/pdf>
- Tuck, E., & McKenzie, M. (2015). *Place in research*. New York: Routledge. DOI: 10.4324/9781315764849
- Tuck, E., McKenzie, M., & McCoy, K. (2014). Land education: Indigenous, post-colonial, and decolonizing perspectives on place and environmental education research. *Environmental Education Research*, 20(1), 1-23. DOI: 10.1080/13504622.2013.877708
- Van der Tuin, I., & Dolphijn, R. (2010). The transversality of new materialism. *Women: a cultural review*, 21(2), 153-171. DOI: 10.1080/09574042.2010.488377
- Van Poeck, K., & Lysgaard, J. (2016). The roots and routes of Environmental and Sustainability Education policy research. *Environmental Education Research*. 22(3), 305-318. DOI: 10.1080/13504622.2015.1108393
- Verlie, B., & CCR 15. (2018). From action to intra-action? Agency, identity and ‘goals’ in a relational approach to climate change education. *Environmental Education Research*, 1-15. DOI: 10.1080/13504622.2018.1497147
- Warren, K. (1990). The power and promise of ecological feminism. *Environmental Ethics*, 12(2), 125-146. DOI: 10.5840/enviroethics199012221
- Whatmore, S. (2006). Materialist returns: practising cultural geography in and for a more-than-human world. *Cultural Geographies*, 13(4), 600-609. DOI: 10.1191/1474474006cgj377oa
- Witmore, C. (2014). Archaeology and the new materialisms. *Journal of Contemporary Archaeology*, 1(2), 203-246. DOI: 10.1558/jca.v1i2.16661
- Wright, S.L. and Kelly, F.J. (2017). Plastic and Human Health: A Micro Issue? *Environmental Science and Technology* 51(12), 6634–6647. DOI: 10.1021/acs.est.7b00423