#### Forest schools: Moving towards an alternative pedagogical response to the Anthropocene?

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**Abstract**

In this paper I consider whether forest schools provide a space where we could rethink pedagogy in the Anthropocene. I explore the challenges and possibilities of thinking beyond the business-as-usual of human-centric pedagogies drawing upon an ethnographic study of two forest schools, located in the West Midlands of England conducted in 2014-2015. I take a more-than-social approach, which moves beyond narrow essentialist constructions of nature and childhood (*see* Kraftl, 2013). I use both Barad’s (2007) theory of agential realism, to explore children’s lively intra-actions with more-than-humans at forest school, and Haraway’s (2016) concept of worlding, to examine collective world making and remarking. Through this conceptual framing I explore whether forest schools are or could become a space for more-than-social pedagogies in which children might imagine and care for other worlds. If so, how might this kind of other-world imagining and caring gesture towards an alternative pedagogical response to the Anthropocene?

# **Key words: Anthropocene, children, forest school, pedagogy, more-than-human, more-than-social.**

## Introduction

Earth scientists have proposed a new epoch: the Anthropocene, whereby human activities have changed the earth’s systems to such an extent that “humanity… has become a planetary-scale geological force” (Steffen et al., 2015, p.94). Steffen et al., (2015, p.94) argue that in the earth sciences ‘human activities’ and ‘biophysical Earth Systems’ have been viewed as operating independently of each other, but now it is impossible to understand them in isolation. In response, a diversity of cross-disciplinary Anthropocene narratives have emerged in response to the scientific evidence presented by earth scientists that anthropogenic climate and environmental change is altering and damaging earth systems. However, some are critical of Anthropocene discourses that retain ‘human-exceptionalist business-as-usual commitments’ (Haraway, 2016, p.49), and which continue the human-centring that ‘saps our capacity for imagining and caring for other worlds’ (p.50). Haraway’s (2016) provocation to us is to respond to anthropogenic ecological challenges with a language and in ways that does not continue human domination over more-than-human worlds.

Responding to such criticisms, I consider the potential for a more-than-human response to the dilemmas raised by the Anthropocene, using the example of forest schools. I consider whether forest schools can provide a space for rethinking pedagogy in the Anthropocene. Drawing upon an ethnographic study of two forest schools, located in the West Midlands of England, which I conducted in 2014-2015, I explore the challenges and possibilities of thinking beyond the business-as-usual of human-centric pedagogies. I take a more-than-social approach, which moves beyond narrow essentialist constructions of nature and childhood (*see* Kraftl, 2013). This approach incorporates an array of phenomena, including more-than-humans, cultures, narratives and discourses, and views them all as entwined shapers of forest school pedagogies.

There is no fixed definition of a forest school, but they typically involve year round outdoor learning for children aged 3 to 8 years, who regularly and repeatedly visit the same ‘natural’ space with a qualified forest school teacher (normally for at least six weeks) (Knight, 2016). Forest schools have expanded rapidly in the UK from their emergence in the 1990’s, when only a handful existed, to 2015 when the Forest School Association (FSA) announced that 12,000 people had trained as forest school practitioners (The Guardian, Tuesday 21 April 2015).

Proponents of forest schools claim that they restore children’s connection to nature. This is an argument that draws on the ‘biophilia hypothesis’, originally proposed by Edward O. Wilson (1984), whereby humans are seen to need a strong bond with nature to be healthy (Kellert and Wilson, cited in Knight, 2016, p. 88). For instance, Knight (2013) argues that since industrialization people have been separated from their natural environment, triggering ‘crises of obesity, behaviour problems and poor social skills’ (p.3). Through this underpinning ‘biophilia’ narrative, nature is often romanticize and located in the countryside. It is constructed as a healthy, wilder and more creative play space than inner-city areas, which are portrayed as unhealthy and lacking good quality play opportunities (Knight, 2011, p.14). In the UK, forest schools are seen as an intervention that allow for children to be reconnected with a very specific vision of nature – the British woodland - which is viewed as offering children richer play possibilities than they would experience in their daily urban lives.

A complicated, uneven and at times contradictory mix of pedagogical inﬂuences shape forest schools, including experiential learning; play-based learning; child development theories; environmental science; and ‘nature’ studies. Within the UK forest schools in my ethnographic study, environmental science had become a dominant pedagogy due its embeddedness within the National Curriculum. Children were encouraged to undertake systematic and scientific studies that involved the identification and classification of the species that inhabited the woodland. However, other forest school studies have found a main focus upon pedagogies that promote personal, social, and emotional development (Harris, 2009, p.273). Although forest school pedagogies may be mixed and varied, they are still underpinned the same humanist nature-culture divide that structures western thought and education. Despite moving outside of mainstream classroom-based education, the forest school woodlands learning environments remain spaces in which the ‘business-as-usual’ of humanist pedagogies still take place.

I am interested in whether any other kinds of learning might be taking place in forest schools, beyond the formal and embedded humanist pedagogies. Could forest schools unintentionally open up opportunities for ‘caring for and re-imagining other worlds’ (Haraway 2016, p.50) and for responding to the ecological challenges posed by the Anthropocene without reverting back to the nature-culture divide? Therefore, I pose these key questions: ‘Despite their explicit intentions, do forest schools inadvertently create a more-than-social pedagogical space in which children might imagine and care for other worlds? If so, how might this kind of other-world imagining and caring gesture towards an alternative pedagogical response to the Anthropocene?

These key questions will be answered later in the paper through discussion that is based upon reflections from my ethnographic study of forest school. Before, I begin that discussion I provide some background to humanist pedagogies that have influenced the forest school movement in the UK. I also give an outline of some ‘more-than-human pedagogies’ from the fields of childhood studies and early childhood education that challenge the humanist concepts that are commonly applied in education.

**Humanist forest school pedagogies**

Forest schools in the UK have been inspired by the Scandinavian ‘udeskole’, meaning ‘outdoor school’, which involves the teaching and learning of curriculum outside the classroom for school children aged 7-16. Udeskole is often considered to be an alternative to didactic forms of learning (whereby knowledge is seen as transferred from teacher to student) and instead encourages forms of experiential learning that are place-based (Waite, [Bølling](https://www.tandfonline.com/author/B%C3%B8lling%2C%2BMads) and [Bentsen](https://www.tandfonline.com/author/Bentsen%2C%2BPeter), 2016). Learning takes place in a range of settings, including farms, forests, parks and factories (Jordet, cited in Bentsen, Mygind and Randrup, 2009, p.32), with teachers setting inductive learning activities, such as problem solving tasks that require collaboration ([Waite](https://www.tandfonline.com/author/Waite%2C%2BSue), [Bølling](https://www.tandfonline.com/author/B%C3%B8lling%2C%2BMads) and [Bentsen](https://www.tandfonline.com/author/Bentsen%2C%2BPeter), 2016). Following the Udeskole model, UK forest schools emphasize experiential and place-based learning (Bentsen, Mygind and Randrup, 2009) usually in a woodland (Waite, [Bølling](https://www.tandfonline.com/author/B%C3%B8lling%2C%2BMads) and [Bentsen](https://www.tandfonline.com/author/Bentsen%2C%2BPeter), 2016).

Although focused upon learning outside the classroom, forest school pedagogies are still distinctly anthropocentric (Davis, cited in Waite, [Bølling](https://www.tandfonline.com/author/B%C3%B8lling%2C%2BMads) and [Bentsen](https://www.tandfonline.com/author/Bentsen%2C%2BPeter), 2016). Their pupil-centred pedagogies continue to generate the Cartesian divide between ‘nature’ and ‘humans’. Learning is seen a human activity that is driven by the activities of the learner, who is seen as an autonomous actor, who undertakes learning *about* the forest, and therefore consideration about the role that more-than-humans play in learning is limited. Pedagogy is initially highly structured, with teachers identifying and supporting activities for children to do, in what is seen as a scaffolding approach until children become confident and more independent in outdoor spaces (Waite, [Bølling](https://www.tandfonline.com/author/B%C3%B8lling%2C%2BMads) and [Bentsen](https://www.tandfonline.com/author/Bentsen%2C%2BPeter), 2016). Forest school is seen as affording opportunities to consolidate classroom learning through play-based experiential learning (Knight, 2016). These times of more structured learning can involve activities linked with the science curriculum, for example performing experiments that confirm scientific theories, such as observing things that float or sink (Knight, 2011, p.31). The National Curriculum for Science (2015) in England, is framed around environments, habitats, interdependence and classification. This curriculum encourages positivist ways of teaching and learning, where knowledge of the natural world is seen as objective and universal.

Over time, forest school pedagogies are expected to become less structured, more play-based and child-led, with children making personal play choices (Waite, [Bølling](https://www.tandfonline.com/author/B%C3%B8lling%2C%2BMads) and [Bentsen](https://www.tandfonline.com/author/Bentsen%2C%2BPeter), 2016). However, some studies show that tensions that arise when educators, as the ‘experts’, struggle to modify adult-directed teaching and allow more play-based learning to evolve (Waite and Davis, cited in Waite, [Bølling](https://www.tandfonline.com/author/B%C3%B8lling%2C%2BMads) and [Bentsen](https://www.tandfonline.com/author/Bentsen%2C%2BPeter), 2016, p. 876). When experiential play-based pedagogies are realised, play is seen as being prompted by the child’s surroundings, but the focus is still on the child as the one who does the discovering and forges new knowledges. The forest provides a stimulating play space within which the child can experiment with social relations (Archard, citied in Knight, 2016). These understandings of play are influenced by social constructivist theorists, namely Piaget and Vygotsky, who suggest that children construct knowledge from direct experiences of the world and that adults/peers facilitate learning by introducing new knowledge/experiences in manageable units, building up a child’s knowledge base (Knight, 2016). Through this lens, play is linked directly to human development theory, again restricting any understanding of its role in learning to exclusively anthropocentric terms. There is nothing about these conventional humanist forest school pedagogies, whether structured and scientific or more play-based, which offer non-human centric ways of re-imagining and responding to the Anthropocene.

**More-than-human pedagogies**

To move towards alternative pedagogical responses to the Anthropocene, we need to look beyond humanist theorisings of play and pedagogy. A growing body of childhood and education scholars are helping to do this, by drawing upon the more-than-human relational conceptualisations of posthumanist theorists and philosophers.

Drawing upon Deleuze’s ontology of ‘the body’ whereby ‘a body can be anything; it can be an animal, a body of sounds, a mind or an idea; it can be a linguistic corpus, a social body, a collectivity’ (Deleuze, citied in Harker, 2005, p.57). Harker (2005) highlights the non-human ontological aspects of children’s play. Noting that children often having an aesthetic-affective openness towards their surroundings- an attentiveness to non-humans and their vitality, Harker reworks play as collective ontological embodiment, which is not just as being about children’s bodies, but an array of objects, sounds, ideas, animals and habits that become part of the body when playing (Harker, 2005, p.57). Harker (2005) conceives play performances as co-constituted events involving multiple bodies. This exceeds humanistic understandings of agency. Harker’s work (2005), like Barad’s (2007) concept of ‘intra-actions’ and Haraway’s (2008) notions of ‘naturecultures’ and of ‘worlding’, acknowledges that agency is more-than-human, relational and generative.

Barad’s (2007) theory of agential realism is particularly useful as a framework for opening up more-than-human ways of understanding the pedagogical relationship, as it challenges the idea that independent entities pre-exist their action upon another. Barad (2007) views all phenomena as intra-active, co-emerging through encounter and intra-action, and therefore agency too is ‘… a matter of intra-acting; it is an enactment, not something that someone or something has’ (Barad, 2007, p. 112). When agency is understood relationally, across phenomena and not as something that only humans ‘have’, this calls into question humanism’s premise that agency is an individual, autonomous, intentional and exclusively human capability.

Childhood scholars are using Barad’s theory of agential realism to explore learning as a productive more-than-human relation (Rautio, 2013; Lenz Taguchi, 2010). Rautio’s (2013) study of ‘Children who carry stones in their pockets’, shows how some children are drawn to stones’ aesthetic or/and tactile qualities, which in turn, shape their behaviour. More generally, Rautio (2013) shows how objects co-mingle with us, inviting us to relate to them and allowing autotelic practices to flourish. Autotelic practices are activities that people repeatedly engage in that have no external reward or motivation, such as money or recognition; instead they are internally motivated, as the activity is the goal and the reward in itself (Rautio, 2013). This has implications for learning, and it shows that it is often our material surroundings that spark our thoughts and actions.

Lenz Taguchi (2010) also draws upon Barad’s (2007) concepts to move beyond humanist understandings of pedagogy. She picks up on Barad’s notion of onto-epistemology as “the interdependent and intertwined relationship between theories of being (ontology) and theories of knowing (epistemology)” (Barad cited in Taguchi 2010, p.4) to firm up her own understandings of pedagogy as inherently intra-active. Lenz Taguchi (2010) presents the idea of intra-active pedagogy as a collaborative learning process between more-than-humans, children and teachers, which challenges the binaries of discourse/matter, theory/practice and mind/body that underpin humanist pedagogies (Lenz Taguchi, 2010). Intra-actions are seen as the continuous, relational basis of learning, including the pedagogical intra-actions between children, chairs, books, pens, papers etc, not just those between children and teachers (Lenz Taguchi, 2010).

Childhood scholars and early childhood educators from the Common Worlds Research Collective are strongly influenced by Haraway’s (2008) entangled environmental philosophies that refuse the separate categories of nature and culture. They are also influenced by her calls to find alternatives to human-exceptionalist responses to the Anthropocene. For instance, Taylor (2017) and Taylor and Pacini-Ketchabaw (2015) propose ‘common world pedagogies’ as a way of recognizing how children are already learning through their encounters and relations with the more-than-humans around them, and as a way of rethinking humans’ place and agency in the world in the Anthropocene. Common worlding, a concept Taylor and Pacini-Ketchabaw (2015) have adapted from Haraway’s ‘worlding’, is the generative process of collectively making and re-making the worlds we cohabit with other beings, entities and forces. It is an active notion that recognizes that "natures, cultures, subjects and objects do not pre-exist their intertwined worldings" (Haraway, 2016, p. 13). Taylor and Pacini-Ketchabaw (2015) also adapt Haraway’s (2008, p. 3) notion of ‘becoming worldly’ which they interpret as ‘becoming attuned to the world’. Taylor and Pacini-Ketchabaw (2015, p.508) observed young children learning ‘from engaging with other species, entities and forces in their immediate common worlds’ without separating themselves off from these worlds. For example, they show how, through encounters with ants and worms, children learn about the entanglement of life and death relations and about their own implication and vulnerability within these relations (Taylor and Pacini-Ketchabaw, 2015). Humanist pedagogies teach children *about* the world and that they exist as separate entities within it through the nature-culture divide. Common world pedagogies refocus upon how children learn *with* the world because they are already a part of its inseparable ‘naturescultures’ (Haraway 2008). This approach ‘shifts the pedagogical focus from individual children to worldly relations. It fosters and supports children to pay attention to and be curious about the other creatures in their immediate worlds. It reinforces that the world is not just about us and acknowledges that we are not its only learners, scriptwriters, actors, movers, makers and shapers’ (Taylor and Pacini-Ketchabaw, 2015, p. 511).

**My ethnography of UK forest schools**

I conducted fieldwork with 51 children, aged four to eleven years, from two forest schools in the West Midlands of England from September 2014 till October 2015. My methods included a mix of walking interviews, and participant observations. I drew upon and extended the ‘follow the thing’ approach developed by cultural geographers of consumption (*see* Cook, 2004), as a way to follow objects, bodies, practices and ideas across the forest schools. I did not select these listed ‘things’ to follow prior to the research, but they emerged as important things as the ethnography unfolded, as they were involved in the co-production of space, learning and knowledges. Following the movement of bodies in and across sites was an important part of this research, which was conducted as a 'go-along' (Kusenbach, 2003). Once participants were comfortable in my presence, I invited them to take part in an audio-recorded walking interview involving a tour of the forest school. The accounts below are drawn from my participant observations and the interviews that took place during fieldwork.

*Meadows School*

Figure 1: Meadows Forest School

Meadows School lies at the centre of a housing estate in Greater Birmingham, which has been partially regenerated with redbrick semi-detached housing. There is a cluster of relatively young silver birches on the edge of the school playing field and this is where the forest school took place (*see figure 1*). The forest school ran as a course for five to six weeks and every child was invited to take part with their peers from the same year group. There was a cost of £6 for the whole course. Anna, a full-time classroom teacher, ran the forest school as an extra-curricular activity on Thursdays from 3:15 till 4:30. The numbers of children that attended this forest school varied from year group to year group, with up to twenty children attending from year two (this was Anna's class), whilst eight to twelve children attended for years one, three, four, five and six. The community is ethnically diverse with a significant proportion of children from second/third generation Black and Minority Ethnic group (BME) families, however the majority of children taking part were white, middle-class girls.

The forest school sessions would begin in Anna's classroom with children changing from their school uniforms into clothing that they had bought with them. After children had been registered in the classroom they would run across the playing field to the gated entrance of the forest school where they would wait. Children would be called into the wood after Anna performed a risk assessment and decided it was safe – often children would be sent back to the field to play games. After games, children would return to the fire square to sit and have a cup of hot chocolate. Anna would tell children about the things that she deemed to be risks and run through a set of rules, before suggesting some activities that children could do. These included building dens, sitting in the fire square, doing mud painting, using the mud kitchen, playing chasing games, making things and creating homes for bugs. The sessions would end with tidying up and returning back to school.

*Woodlands School*

Figure 2: Woodlands Forest School

Woodlands School is located within a large urban housing estate, near to a town centre and also to large park, which was visited occasionally as part of the forest school activities. The school has a diverse community; almost a quarter of children come from families who have migrated from West Africa and Eastern Europe. The Woodlands forest school took place on a large mounded area covered with a mature woodland within the school grounds (*see figure 2*). The wood was fenced off and gated so children could only access it with their teachers when forest school was running. A significant area of woodland was deemed out of bounds.

At the time of my study, forest school had been part of the school’s curriculum and compulsory for all children for five years and was run by two dedicated forest schools teacher, Carolyn, and her assistant Lorraine. It ran on Mondays and Tuesdays as a morning session from 10:00 till 12:00 and in the afternoon from 1:00 till 3:00, and on Wednesday mornings for a small nurture group for children with social and/or emotional needs that were difficult to support in the classroom. Each class of 25 to 32 children would do a half term (five or six weeks) of out-of-the-classroom activities which included forest school sessions, visits to local museums, the library and the park. I observed 19 sessions of forest school, which included classes from reception, years one and three. It was difficult to follow the same class consistently, due to cancellations related to poor weather conditions or other school events, such as sports day.

The forest school sessions would begin with children changing into waterproofs (provided by the school) and wellies. They would then walk up the pit mound where they would sit around the fire square and receive instructions, before doing activities in the wood. The session would end with reflection time at the fire square. The forest school was not part of a formalized natural science program but was connected to the scientific aspects of the National Curriculum (Department of Education, 2015), such as learning to identify and classify different trees, flowers and animals. The structure was designed around the three key stages that form the primary school curriculum in England: early years [nursery and reception classes with children aged 3 to 5 years], key stage 1 [years 1 and 2 with children aged 5 to 7 years] and key stage 2 [years 3 to 6 with children aged 7 to 11 years]. Each key stage has a prescribed set of knowledge and skills that each child is expected to have learnt so activities set at Woodlands school were therefore age dependent. Early years children would be given the choice of three or four activities that they would do with an adult but, if they were allowed, they could also initiate their own play. Children in key stage one and two would be set activities (such as fire lighting, Stone Age house building and plant identification) and were usually placed in small groups accompanied by an adult. The session would finish in the fire square, with Carolyn leading a reflection on what children had done and learnt, before heading back to school.

*Scientific-experiential pedagogies*

At times, forest school educators would set activities that were aimed to develop children’s scientific skills. For example, at Woodlands School, children used classification sheets and an iPad plant identification app to identify different species, encouraging positivist scientific learning methods. This often limited the potential for children’s pedagogical encounters with species through the predetermined task of scientific identification. Scientific pedagogies, and their associated technologies (for example worksheets, iPad apps), structured a particular mode of learning that effectively foreclosed on any possibilities for intra-active learning *with* species, as the following fieldwork extract shows:

Marcus [*age 8*] looked up into the trees and pointed to the blossom in the tree saying, "I didn't know that flowers grew on trees". He uses the plant identification app and classification sheet to name the blossom, but this only had wild flowers on it and not trees. There was not a match; instead so he chose a plant it looked similar as well. He ran to Carolyn naming the plant he identified (*Woodlands school, 03/03/2015*).

For Marcus, the identification task narrowed the scope and potential of his encounter with the blossom. He only related to it as an isolated entity to be categorized and named. He did not explore beyond the blossom-as-entity to uncover the entanglements of tree-soil-insects-weather that was part of its becoming. The prescriptions of the environmental science pedagogy reinforced the Cartesian subject/object and human/nature binaries, which positioned Marcus as the knowing subject and the blossom as the nature object. Marcus was being schooled to know 'nature', not by his embodied and sensory interactions with it, but by recourse to knowledge tools and prescribed categories. His encounters with the tree blossom were rushed and about trying to please an adult. Yet, more-than-social intra-active learning did occur here, not from Marcus’s relations with the tree, but from his relations with the iPad plant classification app. He was able to manipulate a representation so that it fitted with his desire to demonstrate his capabilities and knowledge to Carolyn. This intra-action with the iPad enabled Marcus to enter into a performance of scientist, allowing him to categorize and know *about* rather than learning directly *with* his surrounding environment.

At both forest schools, scientific and experiential forms of learning often fused together, becoming scientific-experiential learning as children through play would enact scientific theories and methods including observation, counting, identification and classification. At times, children would draw upon scientific knowledges during play to make judgements about whether an animal was docile or not, so that they could care for the animal. Worms were often positioned as being vulnerable and dependent due to their bodies being easy to find and handle. Children created homes for worms that became laboratories where they could be observed, touched and examined. Many of the children created worm laboratories by filling up disused pots and plastic containers with soil. Once the worms were inside the pots, children observed them, pulled them out of the soil to show others and/or conducted examinations. The forest school practitioners encouraged the children to create homes/laboratories for worms, as they hoped that, if children learned to care for worms, they would then go on to connect with them, becoming stewards for other plants and animals. By 'caring for' worms through the act of ‘rehoming’ them, the worms were displaced and ‘managed’ for the purpose of educating children in how look after them.

The worms were pedagogically positioned as objects to be learnt about, but also handled and ‘cared for’, making them into vulnerable ‘others’. This notion of human ‘caring’ for nature, or of children learning how to be ‘stewards’, does not necessarily challenge the Cartesian divide or the presumed sole agency and dominance of humans (see Taylor 2017). It can be nothing more than a human-centred controlling process and is different from Haraway’s notion of caring for other worlds. For Haraway, caring “…means becoming subject to the unsettling obligation of curiosity, which requires knowing more at the end of the day than at the beginning” (Haraway 2008, p.36). Unfortunately, Haraway’s (2008) conceptualisation of caring for other worlds as a form of mutual vulnerability and obligation with others was not realized when dominant discourses of care and science combined. Care often became a controlling intervention upon the lives of others, with children, at times, acting violently towards ‘others’, as shown from the following fieldwork diary entry:

Tim [*age 7*] and Ben [*age 7*] began to make a bughouse by piling up large sticks. They then started to rake the leaves in an erratic motion. Then they started to use the rake as a hammer to make worms come to the surface. Tim picked a worm up placed it in the palm of his hand and then in the bug viewer. He looked at it quickly and then dropped it onto the floor, and then continued to hammer the ground again, hitting the worms and mutilating their bodies (*Meadows School, 6/11/2014*).

This extract shows how discourses of care can play into dominating and destructive actions. As they set about creating a home for worms, Tim and Ben increasingly saw the worms as passive docile objects, there for their experimentation and play, there to be subdued, manipulated and controlled. In other words, these children were able to detach themselves from the harm they were causing, because they distanced themselves from the worms and saw them as mere objects.

#### *More-than-social learning with worms and beetles*

There was more going on at forest school than children learning about ‘nature’ through science. The intentional scientific and experiential pedagogies were exceeded, at times, when more-than-social learning took place; for example, through the children’s unstructured encounters with worms and beetles.

This happened, for instance, when children would pick up worms and let them wriggle across the palms of their hands - some would giggle, others would writhe in disgust before placing the worms back onto the ground. In these moments, the worms were not merely passive creatures to be observed. Their sticky, long and wriggling bodies affected the children – disgusted and excited them. They were lively interesting animals that sparked curiosity. From these sticky intra-actions, children would ask questions about worms’ bodies, what they ate and how they lived beneath the ground. Children learnt with worms and responded to them. They began to consider what their needs were and to pay attention to the worms’ entanglement with and capabilities for shaping others. As Taylor and Pacini-Ketchabaw (2015, p.509) also noticed in their study, some children began to recognise the mutual vulnerabilities that existed between themselves and the worms. Here, care emerged through a relational process as a form of mutualvulnerability and obligation with others (Haraway, 2008). This is completely different to the ‘hegemonic ethics of care’ (Puig de la Bellacasa 2012, p.198) seen when Tim and Ben wielded control over the worms they were supposedly ‘caring for’ and mutilated them.

A similar curiosity-led learning process happened when the children responded to the liveliness of beetles with surprise, delight, excitement and enthusiasm. Their intra-actions with these bugs were not just about identifying them, but about getting to know with them, as the following diary entry shows:

Ebele [*age 11*] noticed two cardinal beetles on a tree trunk. The beetles were mating and she watched them before calling over the other children and adults “Look what I’ve found”. Children gathered around the tree and they watched the beetles intently without saying anything. Later, when they returned back to their activity of building a den they had a conversation about the beetles – about their rarity, bright bodies, reproduction, about why are they in the wood and whether they will return. Some children returned to observe the beetles again (*Woodlands School*, *11/06/2015*).

Ebele's discovery of the cardinal beetles stimulated an unintentional learning event, with children spontaneously gathering to observe them. Attracted to the brightness and strangeness of the beetles, their curiosity sparked a conversation and ongoing intra-active learning. This was not a linear cause and effect event, but the beetles flowed in and out of the children’s thoughts and conversations for the rest of the forest school session. In these moments, the children’s learning went beyond identification charts and classification frameworks or the world as known by adults. They showed that they were attuned to the environment, noticing things that passed adults by. This example of spontaneously learning with the beetles shows the importance of giving children space and time to engage in non-teleological and relationally-based more-than-social learning. The children learnt by being affected by and open to the beetles’ behaviours/differences.

These spontaneous child-worm and child-beetle encounters opened up a space of possibility for relational more-than-human learning that was responsive to imagining and caring for other worlds. They exceeded the intentions of the humanist scientific-experiential forest school pedagogies.

*More-than-social learning with mud*

In the winter, at Woodlands School, the paths within the central part of the wood turn into sludgy scars ploughed up by multiple footsteps. It is a sea of mud - an indivisible mass of matter containing twigs, grass, stones, water, leaves and rotting vegetation that is all-at-once solid, flowing and more (Horton and Kraftl, 2017). This mud does not exist as an isolated entity. Its mass swells, oozes beyond the forest school into the classroom and homes as it travelled on children’s bodies. It becomes entangled with weather, bodies, leaves, water and furniture, and its properties change. The thick, glutinous mud sticks to children’s wellies and waterproof trousers, un-footing some and causing them to trip and fall into the mud. Some parts of the path are designated ‘off bounds’ as they become increasingly boggy, but some children still try to run through the thick mud as a challenge to see who can get to the other side.

In my study, I noticed that over time, children became attuned to the way that mud alters the landscape of the forest school. For instance, when I interviewed them, Tyler and Bemi (*aged 8*) described how the mud changed over the course of the year from being hard and dry in summer to being a ‘swamp’ that restricted their movements and actions. Tyler highlighted how these changes had risks associated with them, connecting summertime drought to potential outbreaks of fire. Tyler and Bemi’s account shows that they became attuned to the ways that the forest school environment changes through the seasons and they made connections to ecological challenges.

I also observed that many children were drawn to mud. They would dig mud up with sticks or use their heels and then go on to roll, squash, stretch, and flick and pull it apart. The children had an aesthetic-affective openness towards mud - they were open to it shaping their bodily performances and practices (Harker, 2005). The mud-child encounters I observed were also autotelic in nature - they were done for no external reward or motivation but were enjoyed and sustained in themselves (see Rautio, 2013). Children would smear the fluid mud on their skin. They seemed to initially experience it a discomfort, due its cold, running feeling across their skin. But as the mud warmed and moulded to their arms, it started to dry, thicken, and harden - pulling their skin tighter and enlivening their nerve endings. It appeared that mud offered the children varied, interesting and satisfying kinds of embodied and sensory experiences that differed from contact with other matters. This is because it takes on and changes into many forms through its interactions - it can be fluid, watery, oozing, solid, crumbly and hard. The children’s highly sensory encounters with mud can be seen as forms of intra-active embodied pedagogy whereby the mud is so interactive with children’s bodies that it can no longer be seen as a discrete, external ‘natural’ object to be studied through scientific methods.

There was also something instinctive about children’s relations with mud. For instance, when they rolled and shaped the mud between their fingers, they seemed to be unconsciously responding to its invitations as a tactile and sticky material. When asked ‘Why are you rolling mud?’ the common response was ‘I don’t really know’. These moments were not adult-directed. They were spontaneous, playful intra-actions that broke away from organized activities, such as den building or identification exercises. They were also autotelic, as the children seemed to forget themselves and become lost in the flow of mud intra-actions. This kind of unselfconscious becoming with the mud has the potential to produce rich material-imaginaries. Such immersive intra-active moments can liberate children from the constraints of formal curricula, and allow them to imagine how the world could become differently (Rautio, 2013).

One such moment was when Mia *(aged 9*) and Helen (*aged 10*) modelled some clay onto a tree. As they constructed a face out the clay, Helen said, “We think that trees are like hands and it’s like a body, so we put a face on it”. This is an example of a form of imagining that blurs the ontological boundaries between mud, trees and humans. By creating hybrid forms out of mud and tree, these children were blurring the binary logics of nature/culture, and subject/object that are foundational to humanist pedagogies. Helen explored and experimented with ideas about tree- human relations, moving beyond ideas about trees as belonging in ‘nature’ separate from our ‘cultural’ lives. The making of the tree faces shows how trees, for Helen and Mia, are alive, have agency and affect. It show how children can imagine the world otherwise, and tell different stories about it.

#### Conclusion: Moving towards an alternative pedagogical response to the Anthropocene?

When children were able to learn through their encounters and intra-actions with forest others, like worms, beetles, mud and trees, the ‘business-as-usual’ of human-exceptionalist scientific and experiential forest school pedagogies were exceeded. Instead of simply learning about the ‘nature’ of life in the forest as separate from themselves, they had embodied and affective experiences of their own entanglements in forest ‘naturescultures’ and engaged in the process of collective world making (Haraway, 2008). These encounters and intra-actions provided opportunities for the children to recognize the agency of nonhuman others, and to practice an ethics of care based upon an appreciation of the obligations of mutual vulnerability.

If educators are able to notice and recognise children’s more-than-social learning, they also should be able to rethink forest school pedagogies and create a space for worldly learning to blossom. In response to the key question posed at the beginning of this paper, the predominantly humanist pedagogies of these forest schools were at times interrupted by the children’s worldly relations. These forest schools did inadvertently create a more-than-social pedagogical space in which children at times imagined and cared for other worlds. As well as revealing the hybrid and fluid experiences of more-than-social learning, these times also revealed the potential for being responsive to the world around us. They showed us that we can find alternative pedagogical responses to the Anthropocene.

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